Environmental Assessment

Pine Island Wastewater System Improvements
Everglades National Park

Miami-Dade County, Florida

United States Department of the Interior
National Park Service

June 2003

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On the Cover: NPS Photo. Other than coral reefs, Miami-Dade County slash pine forests are the rarest and most diverse habitat in south Florida. With an understory of saw palmetto and over 200 species of subtropical plants, they are one of the last refuges for the elusive Florida panther. Fire is an important force in maintaining the pinelands in the Everglades. Historically, fires, ignited by lightning, burned through the pine forests every 4 to 7 years. Those fires kept the forest floor clear of fast growing hardwoods which would otherwise overtake and replace the pines, destroying the diversity of the understory. Since many wildfires must now be extinguished for the safety of visitors and local residents, the National Park Service replaces them with prescribed burns when conditions permit safe, manageable fires.

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Environmental Assessment

Pine Island Wastewater System Improvements

EVERGLADES NATIONAL PARK
MIAMI-DADE COUNTY, FLORIDA

Summary

The Pine Island developed area is located at the eastern entrance to Everglades National Park, just outside Homestead, Florida. The project area is associated with a relatively high geological feature known as the Atlantic Coastal Ridge that terminates in Everglades National Park. Pine Island hosts a stand of Dade County slash pine, a critically endangered habitat. Slash pine is a dominant tree, but the pinelands are habitat for many of the rarest plant species in Florida. More than 98 percent of the Dade County pine forests have been lost outside of Everglades National Park.

Pine Island is home to park headquarters, the Ernest F. Coe Visitor Center, park housing (28 units) for a maximum of 70 staff and their families, as well as park maintenance facilities. Currently, wastewater treatment needs at Pine Island are met by individual septic tanks and drainfields that serve individual, or groups of, buildings. Overall, wastewater treatment uses 32 septic systems, installed approximately 40 years ago when this portion of the park was initially developed.

The septic systems serving the Pine Island developed area are aging and in poor condition. They now have inadequate capacity to adequately handle the 25,000 gallons of wastewater generated daily by activities in the Pine Island area. In addition, certain systems do not meet the current state requirement that drainfields be placed a minimum of 24 inches above high groundwater elevation. Although the installations are exempt from Florida regulations ("grandfathered" in as a previous existing development), the park is seeking a long-term solution for Pine Island wastewater treatment needs that would comply with current state and federal requirements regarding wastewater treatment and protect the surrounding environment.

The National Park Service considered and rejected several alternatives before deciding to evaluate the following preferred alternative to provide an effective, efficient, and reliable wastewater treatment system that meets all federal, state, and local operational and effluent standards in an environmentally sound manner. In doing so, the park would ensure sound stewardship of the surrounding ecosystem.

To address current and future wastewater management needs, the park is planning to install a new centralized wastewater treatment facility and new wastewater collection/transmission system throughout the Pine Island developed area. The new facility would use best available technology to meet current and future demand and comply with requirements of regional Everglades restoration efforts, including the Everglades Forever Act and Outstanding Florida Waters regulations. These regulations include effluent limits of 10 parts per million for nitrate and 1 part per million total phosphorus. Treated effluent would be discharged into two constructed raised infiltration beds, located on the abandoned airstrip, approximately ¼ mile south of the Pine Island housing development.

Unlike the no action alternative, the preferred alternative would ensure an effective, efficient, and reliable wastewater treatment system that meets all federal, state, and local operational and

effluent standards in an environmentally sound manner. The preferred alternative would result in minor to moderate, long-term beneficial impacts to several resources, including public health and safety, hydrology and water quality, wetlands, wildlife and habitats, and vegetation.

Public Comment

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. This environmental assessment will be on public review for 45 days. Comments may also be submitted by e-mail to **EVER_Flamingo_WW@NPS.gov**. Please note that names and addresses of people who comment become part of the public record. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.** We will make all submissions from organizations, from businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

COMMENTS MUST BE RECEIVED BY JULY 28, 2003. Please address written comments to:

Superintendent
National Park Service
Everglades National Park
40001 S.R. 9336
Homestead, FL 33034
ATTN: Elsa Alvear

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PURPOSE AND NEED

The purpose of this National Park Service (NPS) action is to provide an effective and efficient wastewater treatment system for the Pine Island/Headquarters area of Everglades National Park. This action would allow the NPS to meet both federal and Florida state public health and safety standards and ensure compliance with the regulatory requirements for effluent discharge into groundwater established by the Florida Department of Environmental Protection (FDEP). The NPS would abandon existing septic systems and drainfields and install a new wastewater treatment facility that exceeds best available technology standards.

The action would eliminate the adverse impacts now associated with the existing septic systems that allow partially treated wastewater to be discharged directly into local groundwater, along with increasing the potential of effluent discharge into nearby Outstanding Florida Waters (OFWs). This action would prevent potential septic system failures by allowing the NPS to construct a new wastewater treatment plant and collection/transmission line system and abandon in place the existing deteriorating septic tanks and drainfields that do not meet Florida state regulatory requirements.

The existing septic systems are not in violation of federal or Florida state law because they were constructed prior to the establishment of regulatory requirements ("grandfathered" in). However, the National Park Service is committed to the implementation of this action to ensure public health and safety, participation in regional Everglades stewardship programs, and provide appropriate protection for this internationally significant resource.

An environmental assessment analyzes the preferred action and alternative actions for their impacts on the environment. This environmental assessment has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (40 *Code of Federal Regulations* 1508.9), the National Park Service's *Director's Order (DO)#12: Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2001b), and the National Historic Preservation Act of 1966 (as amended).

Information contained on pages 155 and 156 of the Value Analysis (Appendix B) is accurately described as follows:

The wastewater treatment plant will be designed to meet or exceed all Florida Administrative (F.A.C.) requirements. Treated effluent limits of the new plant shall be 10mg/L for BOD_5 , Total Suspended Solids, and Total Nitrogen, and 0.1 mg/L Total Phosphorus. These limits meet or exceed F.A.C. Best Available Technology (BAT) standards established for wastewater treatment plants treating less than 1000,000 gallons per day.

Additionally, the treatment system will be designed and constructed to ensure compliance with standards related to Outstanding Florida Waters (OFW), which prohibit the degradation of surface waters within Everglades National Park. Monitoring wells would be strategically located around the percolation ponds to which treated effluent would be discharged to ensure continued compliance with OFW standards.

Standards that would apply to effluent discharges are summarized in Table 3.

PARK MISSION (PURPOSE AND SIGNIFICANCE)

On May 30, 1934 Congress passed an act authorizing a park of 2,164,480 acres to be acquired through public and private donation. Everglades National Park was to be "… wilderness where no development … or plan for the entertainment of visitors shall be undertaken which would interfere with the preservation of the unique flora and fauna of the essential primitive natural conditions now prevailing in the area." It took another 10 years, but in 1947 Everglades National Park was established.

The intermingling of plant and animal species from both the tropical and temperate zones, plus the merging of freshwater and saltwater habitats, provide the vast biological diversity that makes Everglades National Park unique. The area's significant attributes, features, and resources resulted in Everglades becoming the first national park established to preserve purely biological resources. Everglades National Park:

has been designated as a World Heritage Site, a Biosphere Reserve, a Wetland of International Importance, and an Outstanding Florida Water;

supports the largest stand of protected sawgrass prairies in North America;

serves as a crucial water recharge area for south Florida through the Biscayne aquifer;

provides sanctuary for 22 threatened and endangered species;

supports the largest mangrove ecosystem in the Western Hemisphere;

constitutes the largest designated wilderness in the southeast that provides foraging habitat and breeding grounds for migratory wading birds;

contains important cultural resources and is the homeland of the Miccosukee Tribe of Indians of Florida;

functions as an internationally significant estuarine complex in Florida Bay and the park's western coast, providing a major nursery ground that supports sport and commercial fishing;

comprises the only subtropical reserve on the North American continent, preserving a major ecological transition zone where diverse temperate and tropical species mingle;

functions as a major corridor and stopover for neo-tropical migrants in the south Florida ecosystem;

encompasses resources that directly support significant economic activities;

engenders inspiration for major literary and artistic works; and

offers a place where recreational, educational, and inspirational activities occur in a unique subtropical wilderness.

Everglades National Park's mission is accomplished through pursuit of the following goals:

> the preservation of Everglades National Park's resources;
>
> the maintenance of the hydrological conditions, including water quality, quantity, distribution, and timing, within Everglades National Park and the south Florida ecosystem, which are characteristic of the natural ecosystem prior to Euro-American intervention;
>
> providing for public use and enjoyment and a quality visitor experience at Everglades National Park;
>
> allowing visitors to Everglades National Park to experience the park's unique subtropical wilderness values;
>
> assisting the public in understanding and appreciating Everglades National Park and its role in the south Florida ecosystem and providing support in achieving the park's purpose;
>
> strengthening and preserving natural and cultural resources and enhancing recreational opportunities managed by partners; and
>
> assuring that the Seminole and Miccosukee tribes have the opportunity to exercise their existing tribal rights within Everglades National Park to the extent and in such a manner that they do not conflict with the park purpose (NPS 2000).

PROJECT BACKGROUND, OTHER PROJECTS AND PLANS, OBJECTIVES, SCOPING, AND VALUE ANALYSIS

Project Background

The Pine Island area is located on the eastern edge of Everglades National Park (see Figure 1 and Figure 2). The existing septic/drainfield systems serve park headquarters, the main park visitor center (Ernest F. Coe Visitor Center), park entrance station, and housing/maintenance area (see Figure 3). Pine Island wastewater is presently treated with conventional septic tanks and drainfields. The existing system comprises 32 septic tanks and drainfields encompassing a 24,500 square foot area. Most of the system was installed 40 years ago, and is becoming aged. Although technically in compliance with state regulatory standards ("grandfathered" in), the system is not meeting the intent or spirit of the current regulations. Also, certain septic systems have become undersized for current usage, given building expansion that has occurred over the years.

Current Florida state design parameters require that the bottom elevation of septic drainfields be a minimum of 24 inches above the high groundwater elevation. This requirement is not presently being met by many of the existing drainfields. Therefore, leachate is being discharged to the groundwater with insufficient treatment due to the less than adequate separation (currently less than 24 inches) between the drainfield lines and the high water ground elevation and the type of subsurface soil conditions associated with the site.

These issues increase the concern that the continued discharge of increased quantities of septic system effluent to the local groundwater of Pine Island would eventually degrade the receiving groundwater quality and the surrounding ecosystem. Therefore, the potential degradation over time may lead to adverse effects on natural systems and potable water well supply sources. Currently, sampling of groundwater wells in the Pine Island developed areas has not shown any indication of groundwater contamination (NPS 2002).

Other Projects and Plans

Other projects and plans that are in the vicinity of the Pine Island developed area and have the potential to affect the local environment include:

Flamingo Potable Water System and Wastewater Improvements. On September 20, 2002, the National Park Service issued a Finding of No Significant Impact (FONSI) for the Flamingo Potable Water System Improvement project. With the environmental assessment and associated compliance completed, improvements to the Flamingo potable water system began in November 2002. Also, the Flamingo Wastewater System Improvements project is now in the final stage of approval and is scheduled for construction in 2003-2004. However, due to the approximately 35 mile distance between Flamingo and Pine Island, the impact of these construction activities would be minor on Pine Island with the exception of a slight increase in traffic associated with passing construction vehicles.

Pine Island Water System. A new Pine Island Water System was completed in June 2002. Two new wells were developed near the existing headquarters pump house site, along with a new filtered treatment system. The Pine Island and Headquarters potable water systems are independent of each other. The two existing wells at Pine Island are still being used in conjunction with a new filtered treatment system. The existing water storage tank at Pine Island was replaced with a new 70,000 gallon storage tank, along with a new water distribution system. The two pump houses are located within the adjacent tree canopy. The new 70,000 gallon Pine Island water storage tank is somewhat more visually intrusive.

Hole-in-the-Donut Wetlands Restoration. Farming occurred in Everglades National Park in the area known as Hole in the Donut until the late 1970s. The park is restoring this area to freshwater wetlands habitat. Presently, the park is scraping and stockpiling disturbed soil and exotic plant material from the Hole-in-the-Donut area of the park, approximately 8 miles from the Pine Island project site. An environmental assessment for the temporary onsite storage was approved in 1998 (NPS 1998). This 5-10 year project is operational only between the months of November and May. Once the earth moving equipment is brought on site, it remains there for the 7 month operational period. Equipment operators and occasional equipment service vehicles travel to and from the project site via the main park entrance road, arriving early and departing in late afternoon. This project would generate only a slight increase in additional traffic and the impact would be minimal (Norland pers. comm. 2002).

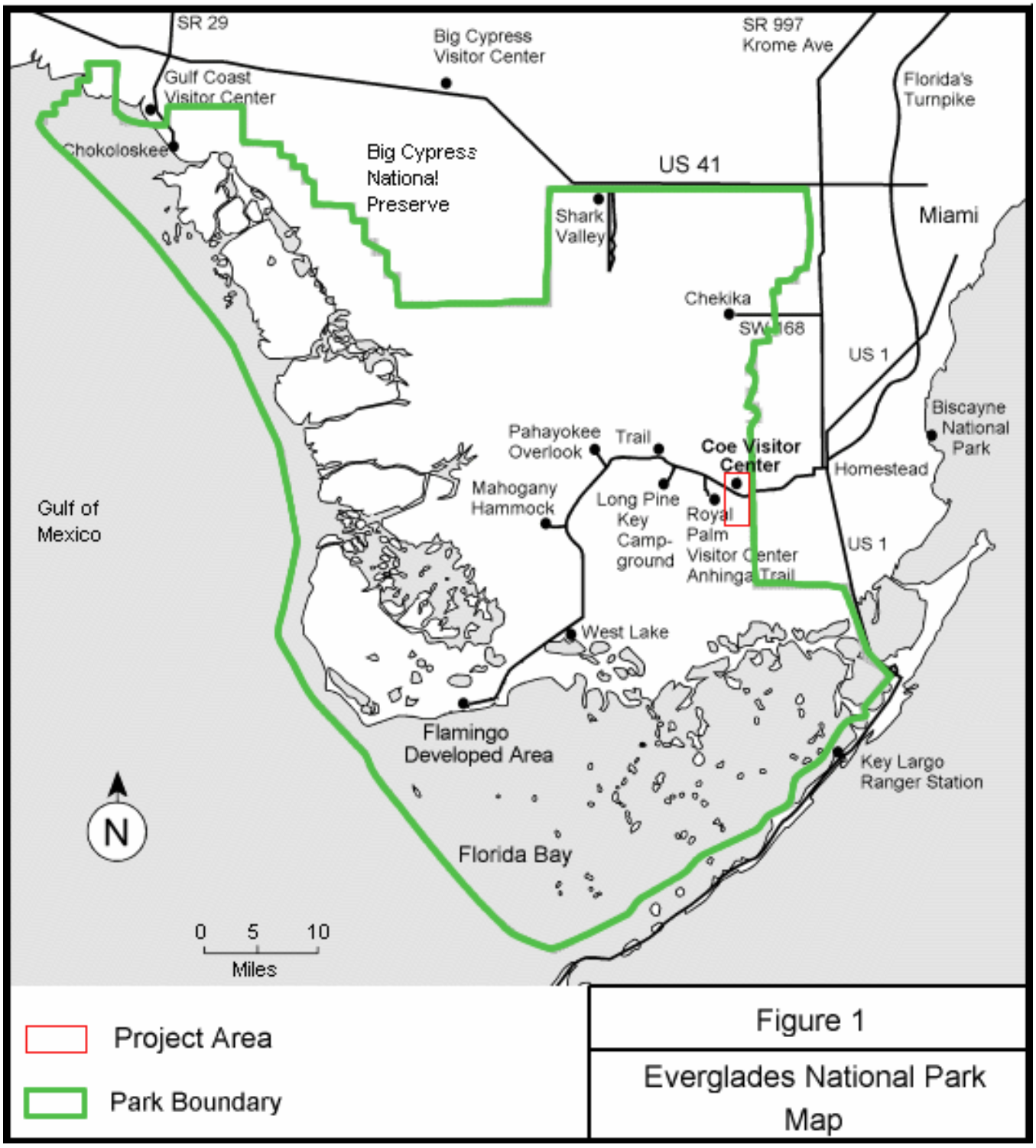

Figure 1

Everglades National Park Map

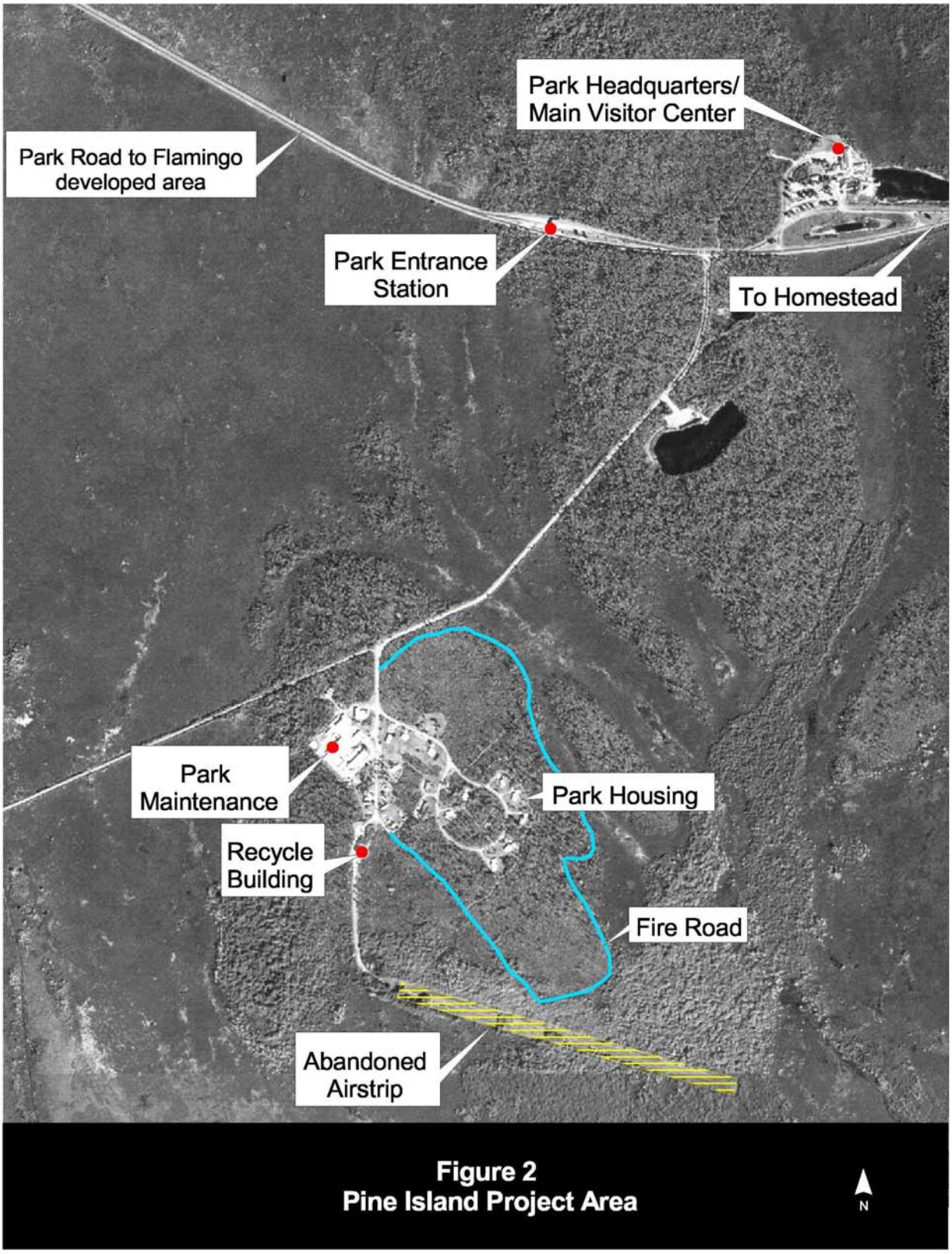

Figure 2
Pine Island Project Area

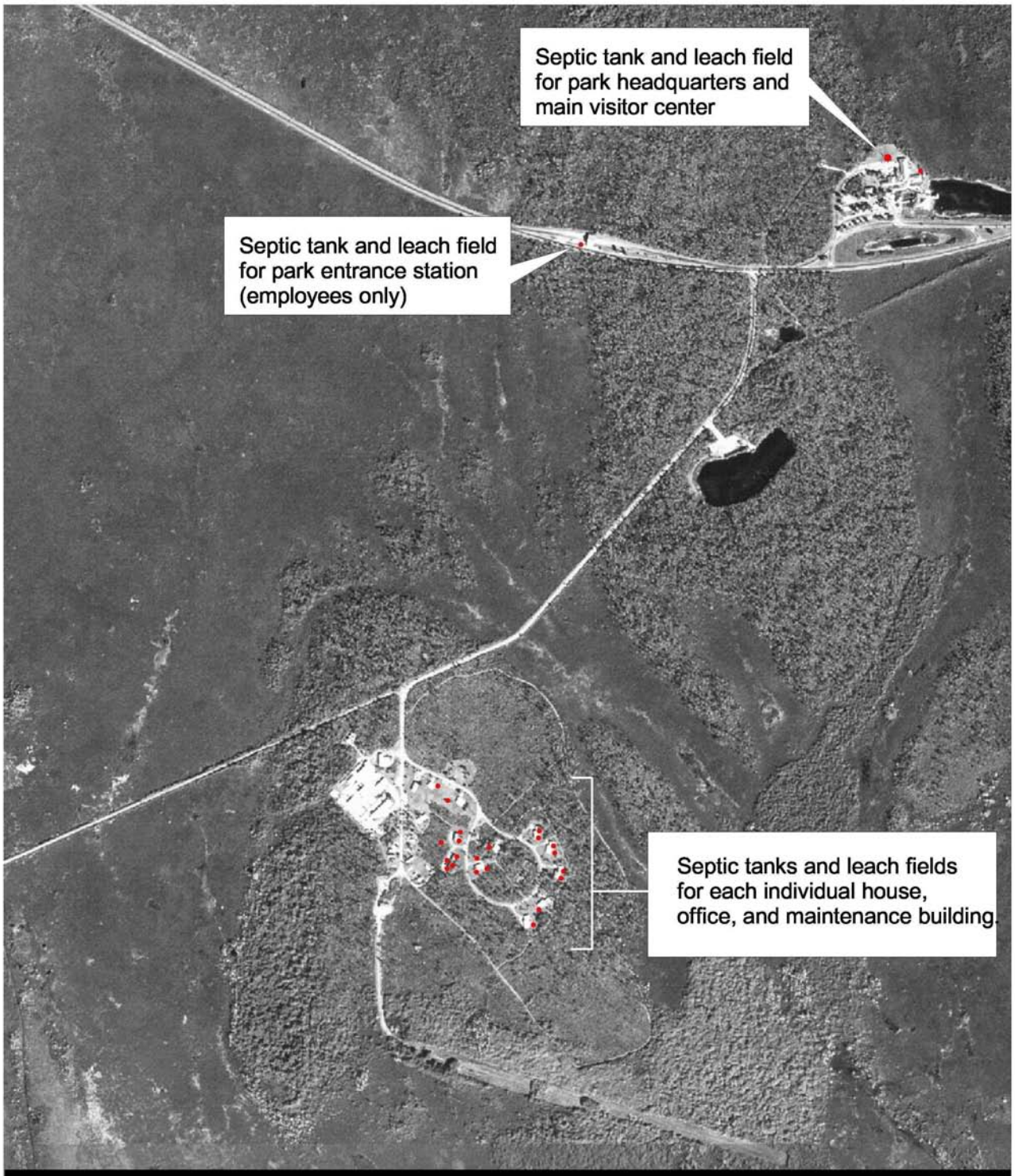

Figure 3: Pine Island - Existing Septic/Leach Field Wastewater Treatment System

Exotic Vegetation Management Plan. The park is, within the foreseeable future, planning to prepare an Exotic Vegetation Management Plan to control non-native plant species that would benefit the entire park, including Pine Island. Nutrient discharges, potentially associated with this project, would negligibly contribute to the type of unnatural condition that would benefit the colonization of exotic species. However, any impact this project might have would hardly be noticeable because the Pine Island area has already been heavily colonized by exotic species.

General Management Plan Everglades National Park. Everglades National Park has recently initiated the preparation of a parkwide general management plan. As a matter of policy and professional commitment, this parkwide planning effort would evaluate and coordinate all park plan/actions to ensure compatibility with the long-term vision for the park.

Regional resource development/actions on both public and private lands in the vicinity, such as agriculture, urban development, and other activities that could adversely affect hydrology and surface water quality, including:

C111 Canal Project: The C-111 Basin is located in the southernmost portion of Miami-Dade County and adjacent to Everglades National Park. In the 1960s, the area was channelized as part of the Comprehensive Central & Southern Florida (C&SF) Flood Control Project. Major restoration efforts are now ongoing in this area with goals of improving hydroperiods and timing of water deliveries to Everglades National Park while maintaining water table elevations to prevent salt water intrusion into the local groundwater.

Modified Water Deliveries Project. This project involves construction of alterations to the water management system (C&SF project) at the park's northern boundary that could operate to bring immediate benefits to hydrological restoration of Shark River Slough inside the park. By removing some existing structures and installing new features, the project would recreate a single functioning hydrologic system in four areas within and north of the expanded park boundaries that are currently separated. The results should include improvements to the quantity, quality, timing and distribution of water flows. Some project features have been completed and the introduction of improved water flows is currently anticipated by 2006.

Comprehensive Everglades Restoration Plan. The comprehensive plan is a framework and guide to restore, protect, and preserve the water resources of central and southern Florida. The plan is a component of the world's largest ecosystem restoration effort encompassing 16 counties and an 18,000-square-mile area. CERP includes more than 60 elements designed to capture, store and redistribute fresh water previously lost to tide and to regulate the quality, quantity, timing and distribution of flows. Eight CERP projects are intended to provide improvements to flows in and around Everglades National Park. Implementation of CERP will take more than 30 years to complete and will cost an estimated $8 billion." Should all three projects (CERP, Modified Waters, and the C-111 Project) be successfully implemented, their cumulative impact is expected to raise the groundwater table in the Pine Island area by less than one foot.

Objectives

The objectives of this action are to:

Minimize impact on park resources by designing a wastewater treatment system that utilizes technologies to ensure that the system meets or exceeds established treatment standards commensurate with the protection of this internationally significant protected area.

Ensure that the wastewater treatment system meets or exceeds standards set by the Florida Department of Environmental Protection.

Ensure that the wastewater treatment system is in compliance with regulations related to Outstanding Florida Waters and the Everglades Forever Act.

Ensure that the effluent from the wastewater system is disposed of in an environmentally sound manner.

Provide appropriate treatment for wastewater generated at park headquarters, Ernest F. Coe Visitor Center, main park entrance station, district maintenance, supply and ranger facility, and 28 park housing units.

Avoid potential wastewater system failure and utilize existing surface disturbance to the greatest extent possible.

Eliminate adverse impacts of wastewater on groundwater of Everglades National Park, improve receiving groundwater quality by replacing aged septic systems with a centralized wastewater treatment system, including collection and transmission lines.

Ensure that construction and operation associated with the new wastewater system do not adversely impact threatened and endangered species.

Minimize adverse impacts on visitors (aesthetic intrusions), operations and park staff.

Use efficient and cost-effective actions in achieving project purpose and objectives.

Public Scoping

Public scoping is an early and open process to solicit public and internal concerns relating to a proposed action. The Council on Environmental Quality (CEQ 1978) guidelines for implementing the National Environmental Policy Act (NEPA) and the National Park Service (NPS) National Environmental Policy Act guidelines contained in *Director's Order # 12: Conservation Planning, Environmental Impact Analysis and Decision Making Handbook* (NPS 2001b) require public scoping of federal actions that would require an environmental impact statement. Although public scoping is not required for an environmental assessment, the National Park Service conducted scoping for this new wastewater system for the Pine Island developed area to ensure input from all interested stakeholders. A four-page scoping brochure was distributed to 650 individuals, organizations, agencies, Indian tribes, and an unaffiliated Native American group, and was posted on the park's website. The NPS asked the tribes if they wished to begin government to

government consultation. The park also held two public scoping workshops in February 2003, one in Everglades National Park and one in Florida City.

For this Pine Island wastewater system improvement project, scoping helped define the range of wastewater system alternatives and identify the impact topics that should be considered for the project. A summary of public scoping comments may be found in Appendix A.

Value Analysis

A value analysis was finalized by the National Park Service on May 20, 2002 (NPS 2002). During the value analysis process, an interdisciplinary planning team refined and evaluated design options that have the ability to meet project and National Park Service objectives. Potential impacts to the natural environment were also assessed. Through this process, suitable alternatives were identified for full analysis, and other options were dismissed from further consideration. The National Park Service evaluated several wastewater treatment alternatives to meet the Pine Island wastewater project needs for park headquarters, Ernest F. Coe Visitor Center, main park entrance station, district maintenance, supply and ranger facility, and 28 park housing units.

The Value Analysis (Appendix B of this document) contains erroneous information (on pages 155 and 156) that is more accurately described in the following two paragraphs.

The wastewater treatment plant will be designed to meet or exceed all Florida Administrative Code (F.A.C.) requirements. Treated effluent limits of the new plant shall be 10 mg/L for BOD_5, Total Suspended Solids, and Total Nitrogen, and 0.1 mg/L Total Phosphorous. These limits meet or exceed F.A.C. Best Available Technology (BAT) standards established for wastewater treatment plants treating less than 100,000 gallons per day.

Additionally, the treatment system will be designed and constructed to ensure compliance with standards related to Outstanding Florida Waters (OFW), which prohibit the degradation of surface waters within Everglades National Park. Monitoring wells will be strategically located around the percolation ponds to which treated effluent will be discharged to ensure continued compliance with OFW standards.

Standards that will apply to effluent discharges are summarized in Table 3.

The value analysis evaluated the following:

Value Analysis Option 1. Individual Mound Systems

Individual mounded drainfields would be constructed that would meet the Florida Department of Health requirement of being at least 24 inches above the high water ground elevation. This option would require imported fill and the addition of pumps at the septic tank outlets because the drainfield lines would be too high for gravity flow.

Value Analysis Option 2. Separate Prefabricated Package Treatment Plants for Headquarters (includes main visitor center and park entrance station)

This option proposes a separate prefabricated package treatment plant at each of the two sites with either separate on-site effluent disposal (raised infiltration bed) or a centralized effluent disposal (raised infiltration bed); the latter requiring 3,000 feet of force main. Space limitations

for both the plant and effluent disposal at the headquarters site would be a limiting factor for this option.

Value Analysis Option 3. Combined Treatment Plant for Headquarters and Pine Island

Pumping stations and force mains would be required to move sewage from headquarters and Pine Island to the plant site due to the flat topography. Three options for the plant site include the boneyard/pond area between headquarters and Pine Island, the abandoned airstrip near Pine Island, and adjacent to the recycle facility at Pine Island. Four options were considered for disposal of the effluent:

Value Analysis Option 3a

Raised infiltration beds (two, alternating) would be located at the borrow pit. A massive amount of fill would be required to fill the borrow pit and would be taken from the Hole-in-the-Donut area of the park.

Value Analysis Option 3b

Raised infiltration beds (two, alternating) would be located on the abandoned air strip.

Value Analysis Option 3c

Effluent disposal to the city of Homestead.

Value Analysis Option 3d

Effluent would be sprayed (irrigated) on the abandoned airstrip.

Value Analysis Option 3e

Effluent disposal would be taken outside the park for offsite disposal (interagency agreement).

Value Analysis Option 4. Pump Raw Sewage to the City of Homestead for Processing

For all Value Analysis options except option 4, sludge would be periodically removed from the park to a permitted disposal site.

Value Analysis Preferred Option

The 2002 Value Analysis recommended a combined treatment plant for headquarters and Pine Island (Option 3), located at the boneyard/pond (borrow pit) area between headquarters and Pine Island, in association with the development and conversion of the borrow pit to serve as a raised infiltration bed(s) (Option 3a).

The NPS preferred alternative reflects the Value Analysis recommendation to develop a combined treatment plant for headquarters and Pine Island; however, after additional scoping and analysis, NPS decided not to select the Value Analysis preferred option (3a) because of potential adverse impacts to the endangered Florida panther (NPS 2002a). Approximately 2,400 truck loads of fill would be needed to fill the borrow pit for conversion to a raised infiltration bed/

effluent disposal system. It was determined that the number and frequency of trucks along park roads would greatly increase the chances of panther mortality. Also, the additional costs associated with hauling massive amounts of fill and the repair of park roads, following the hauling operation would be prohibitive (see "Alternatives Considered but Rejected" section).

The NPS preferred alternative (Option 3-3b) utilizes previously disturbed sites near the existing Recycle Building for the combined treatment plant and the abandoned airstrip for the development of two new raised infiltration beds. This option would have less adverse impacts on park resources and be more cost effective (see "Alternative B, The Preferred Alternative" and impact topic sections).

ISSUES, CONCERNS, AND DERIVATION OF IMPACT TOPICS

Issues and concerns affecting this proposal were identified from past National Park Service planning efforts, and input from environmental groups, and state and federal agencies. The major issues are the conformance of this proposal with the National Park Service Management Policies (2001a), the Everglades National Park Strategic Plan (2000), and other planning documents. Impact topic analysis for this project included: hydrology and water quality; floodplains and wetlands; soils; vegetation; wildlife and aquatic life; endangered, threatened, or protected species and critical habitats; soundscape; cultural resources; public health and safety; visitor use and experience; wilderness; and park operations.

Issues and concerns related to the existing Pine Island Wastewater Treatment System include:

> It does not meet current Florida Department of Health (FDOH) standards for septic tank/ drainfield construction. The bottom elevation of the existing septic drainfield lines is less than the required 24 inches above the high groundwater elevation.
>
> The existing septic systems discharge leachate into the groundwater; therefore, many of the existing systems are degrading the quality of the groundwater in the area and potentially endangering public health.
>
> The septic systems are aged and inadequate in meeting the demand of the expanded Pine Island developed area.
>
> The septic systems are deteriorating rapidly, increasing the chances for further degradation of the surrounding environment.

Impact Topics

Impact topics were used to focus the evaluation of the potential environmental consequences of the alternatives. Candidate impact topics were identified based on legislative requirements, executive orders, topics specified in Director's Order #12 and Handbook (NPS 2001b), *Management Policies 2001* (NPS 2001a), guidance from the National Park Service, other agencies, public concerns, and resource information specific to Everglades National Park.

Derivation of Impact Topics

Specific impact topics were developed for discussion focus and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and executive orders; 2001 National Park Service management policies; and National Park Service knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

Impact Topics Analyzed in this Environmental Assessment

All resources described in impact topics included in this document will be included and described in the "Affected Environment" chapter of this environmental assessment.

Impact topics are the resources of concern that could be affected by the range of alternatives. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. The following impact topics were evaluated: hydrology and water quality; floodplains and wetlands; soils; vegetation; wildlife and aquatic life; endangered, threatened, or protected species and critical habitats; soundscape; cultural resources; public health and safety; visitor use and experience; wilderness; and park operations.

The impact topics originally considered for the Pine Island wastewater collection and treatment project at Everglades National Park are presented in Table 1. The table includes key regulations or policies for each impact topic. Based on site-specific conditions described below, several candidate impact topics were dismissed from further consideration. The rationale for dismissing impact topics is given below.

Each of the retained topics had several issues that merited discussion. Those issues, discussed in detail in the "Affected Environment and Environmental Consequences" section, include the following preliminary list of impact topics:

> Water quality and hydrology were retained because of potential adverse effects on the groundwater and surface water system. The existing drainfield systems insufficiently treat the effluent from the existing septic systems.
>
> Floodplains and wetlands were retained because the project area lies within the 100-year floodplain of hurricanes and tropical storms and is surrounded by wetland habitats (see Statement of Findings for Floodplains, Appendix C).
>
> Soils were retained because the depth of the new collection lines would be buried below the level of the existing fill area, and because of the effects of excavation for installation of the raised infiltration beds.
>
> Vegetation was retained due to the disturbance caused by the construction of the raised infiltration beds and collection/transmission lines, and because of potential effects from degraded water quality (increased nutrient concentration).

TABLE 1: IMPACT TOPICS FOR WASTEWATER SYSTEM IMPROVEMENTS AT PINE ISLAND, EVERGLADES NATIONAL PARK

Impact Topic	Relevant Regulations or Policies
RETAINED	
Hydrology and water quality	Clean Water Act, Executive Order 12088, Executive Order 11990, NPS *Management Policies 2001*; Florida Administrative Code 65-520 Groundwater Standards and 62-302.700 Outstanding Florida Waters
Floodplains and wetlands	Executive Order 11990, Clean Water Act Section 404, NPS Director's Order #77-1, Executive Order 11988
Soils	NPS *Management Policies 2001*
Vegetation	NPS *Management Policies 2001*
Wildlife and aquatic life	NPS *Management Policies 2001*
Endangered, threatened, or protected species and critical habitats	Endangered Species Act; NPS *Management Policies 2001*
Soundscape	NPS *Management Policies 2001*
Cultural resources	Section 106 of the National Historic Preservation Act; 36 *CFR* 800; National Environmental Policy Act; Executive Order 13007; Director's Order 28; NPS *Management Policies 2001;* Native American Graves Protection and Repatriation Act (NAGPRA); Archeological Resources Protection Act (ARPA)
Public health and safety	NPS *Management Policies 2001*
Visitor use and experience	Organic Act; NPS *Management Policies 2001*
Wilderness	1964 Wilderness Act, Director's Order 41, NPS *Management Policies 2001*
Park operations	NPS *Management Policies 2001*
DISMISSED	
Air quality	Federal Clean Air Act (CAA), CAA Amendments of 1990 (CAAA), NPS *Management Policies 2001 Florida Administrative Codes Chapter 62: Air Resource Management Program*.
Ecologically critical areas or other unique natural resources	Wild and Scenic Rivers Act, 36 CFR 62 criteria for national natural landmarks, NPS *Management Policies 2001*
Prime and unique agricultural lands	Council on Environmental Quality 1980 memorandum on prime and unique farmlands
Conflicts with land use plans, policies, or controls	NPS *Management Policies 2001*
Economics	40 CFR 1500 Regulations for Implementing NEPA
Energy requirements and conservation potential	NPS *Management Policies 2001*
Environmental justice	Executive Order 12898
Indian trust resources	Department of the Interior Secretarial Order No. 3206, Secretarial Order No. 3175
Natural or depletable resource requirements and conservation potential	NPS *Management Policies 2001*

Wildlife and aquatic life were retained because of the potential disturbance to wildlife and aquatic species associated with construction activities, potential loss of habitat, and effluent disposal.

Endangered, threatened, or protected species and critical habitat were retained because of the potential utilization of the project area by endangered or threatened species. Additionally, the park intended this environmental document to serve as the basis for appropriate consultation with those agencies charged with protecting wildlife.

Soundscape was retained because of the noise potential associated with the continuous operation of the treatment plant blower.

Initially, cultural resources were considered as a single unit, rather than as individual resource types, because at the time of scoping there was insufficient information to make determinations regarding the presence or absence of specific archaeological resources, historic structures, ethnographic resources, cultural landscapes and museum objects as individual resource types. Additionally, the park intends to use this environmental assessment as the Section 106 Consultation document for consultation with the State Historic Preservation Office (SHPO) and affiliated tribes.

Public health and safety was retained because of the potential for groundwater contamination and human contact with raw sewage from deteriorating septic tanks and drainfields.

Visitor use and experience was retained because the Pine Island area receives heavy visitation, including the Ernest F. Coe Visitor Center and park entrance station.

Wilderness was retained because of the potential change in visitor use associated with the project actions and use of the cypress dome area adjacent to the abandoned airstrip.

Park operations were retained because of the change in operational activities and procedures required with the transition from a septic/drainfield system to a package treatment plant operation.

Impact Topics Dismissed from Further Analysis (Rationale for Dismissal)

All resources described in impact topics dismissed in this document will **NOT** be included or described in the "Affected Environment" chapter of this environmental assessment.

Air quality: Everglades National Park enjoys a Class I clean air status. Lands with this designation are subject to the most stringent regulations. Very limited increases in pollution are permitted in the vicinity. This high air quality is a valuable park resource, enhancing visitation by providing clean air and high visibility to match the unique ecosystem experience. The Clean Air Act of 1963 (42 USC 7401) requires federal land managers to protect air quality, and the 2001 NPS Management Policies direct air quality to be analyzed when planning park projects and activities. The Pine Island project area is developed and receives approximately 500,000 visitors annually, most arriving by automobile (Scott pers. comm. 2002). The no action alternative proposes no construction activities, and no change in air quality would result. Under the preferred alternative, the occurrence of fugitive dust and equipment fumes would be mitigated and would

not likely affect visitors or staff. Because of the high water table, it is unlikely that large quantities of dust would be generated, and any occurrence of construction dust would be localized and very transient. If dust were generated by installation of the wastewater collection system and raised infiltration beds, best management practices for dust suppression would be initiated. Emissions from construction vehicles would be kept to a minimum by restricting idling time. In the context of activities and facilities at Pine Island, no appreciable effects to air quality would be anticipated under either alternative.

Ecologically critical areas: Everglades National Park does not contain any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referenced in 40 CFR 1508.27.

Prime and unique agricultural lands: Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific high-value food and fiber crops. Both categories require that the land is available for farming uses. Lands within Everglades National Park are not available for farming and therefore do not meet the definitions.

Conflicts with land use plans, policies, or controls: Refer to the section "Other Projects and Plans" for a discussion of the conflicts with other plans.

Economics: None of the alternatives described in this environmental assessment would have notable effects on local or regional economic activities. Tourism and visitor contributions to the local economy would not be affected by continuation of current management nor by installation of the new wastewater treatment system. The south Florida economy is large and supported by a multitude of activities. Construction activities associated with the preferred alternative would not contribute measurably to the local or regional economy.

Energy requirements and conservation potential: The National Park Service reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology. Energy efficiency is incorporated into the decision-making process during the design and acquisition of buildings, facilities, and transportation systems that emphasize the use of renewable energy sources. The proposed action alternative does not include increased wastewater treatment capacity, which would require increased energy usage; nor does it call for increased transportation of sludge to locations outside the park. These design components would conserve energy usage, consistent with National Park Service mandates.

Environmental justice: Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that all federal agencies address the effects of policies on minorities and low-income populations and communities. The Pine Island developed area contains no minority or low-income populations or communities as defined in the Environmental Justice Guidance (July 1996). Therefore, none of the alternatives would have disproportionate health or environmental effects on populations of concern.

Indian trust resources: Indian trust assets are owned by American Indians but held in trust by the United States. Requirements are included in the Secretary of the Interior's Secretarial Order No. 3206, "American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and the Endangered Species Act," and Secretarial Order No. 3175, "Departmental Responsibilities for Indian Trust Resources." According to Everglades National Park staff, Indian trust assets do not occur within Everglades National Park. There are no Indian trust resources downstream of the project area. Therefore, there would be no downstream effects on Indian trust resources from either proposed alternative.

Natural or depletable resource requirements and conservation potential: Sustainable practices minimize the short- and long-term environmental impacts of development and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques. Project actions would not compete with dominant park features or interfere with natural processes, such as the seasonal migration of wildlife or hydrologic activity associated with wetlands.

ALTERNATIVES

DESCRIPTION OF THE ALTERNATIVES

The alternatives section describes two alternatives for the Pine Island Wastewater Treatment System. Alternatives for this project were developed to resolve the issues associated with the existing wastewater treatment system. Issues related to the existing system include:

> It does not meet current Florida Department of Health (FDOH) standards for septic tank/ drainfield construction. The bottom elevation of the existing septic drainfield lines is less than the required 24 inches above the high groundwater elevation.
>
> The existing septic systems discharge leachate into the groundwater; therefore, many of the existing systems are degrading the quality of the groundwater in the area and potentially endangering public health.
>
> The septic systems are aged and inadequate in meeting the demand of the expanded Pine Island developed area.
>
> The septic systems are deteriorating rapidly, increasing the chances for further degradation of the surrounding environment.

The no action alternative describes the action of continuing the present management operation and condition. It does not imply or direct discontinuing the present action or removing existing uses, developments, or facilities. The no action alternative provides a basis for comparing the management direction and environmental consequences of the preferred alternative. Should the no action alternative be selected, the National Park Service would respond to future needs and conditions associated with the park's issues without major actions or changes from the present course.

The preferred alternative presents the National Park Service proposed action and defines the rationale for the action in terms of resource protection and management, visitor use and operational use, costs, and other applicable factors.

Sustainability: The National Park Service has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through the sustainable design and ecological sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The preferred alternative subscribes to and supports the practice of sustainable planning, design, and use of the wastewater treatment facility.

Alternative A: No Action / Continue Current Management

Continue current management/no action is the baseline condition against which proposed activities are compared. It is defined as taking no action to change or alter current management.

Under the no action alternative, there would be continued utilization of the 32 existing septic tanks and associated drainfield systems that were constructed beginning in 1959. These systems presently support park headquarters, the Ernest F. Coe Visitor Center, park entrance station (employee use only), park housing, and park maintenance (see Figure 3). The existing wastewater treatment system supports approximately 70 staff and their families living at Pine Island during the peak visitor season; approximately 55 staff and families during the off season, and approximately 186,000 visitors per year that use the restrooms at the Ernest F. Coe Visitor Center (Scott pers. comm. 2002).

The park headquarters septic system, the largest of the 32 septic tanks, includes a single-compartment 3,000 gallon concrete septic tank and drainfield with sixteen 100-foot long drainfield lines. Because the site is not mounded, the drainfield is often partially submerged in groundwater. Most other small systems in the Pine Island area are also periodically partially submerged within the water table. Also, the Pine Island developed area has expanded over the years without any increase in the size of the original septic/drainfield systems. Water use and sewage flows at headquarters vary seasonally according to visitation patterns, with higher flows in the winter and lower flows in the summer.

A small septic tank/drainfield system supports the main park entrance station to serve employees. The system includes a single component 750 gallon concrete septic tank, along with a 300 square foot drainfield.

Each of the 28 park staff housing units and 4 recreational vehicle camp sites have an individual septic tank/drainfield system. Each unit includes a single component 780 gallon (average size) concrete septic tank with a 900 square foot (average size) drainfield. Many of the drainfields are mounded, but are still not elevated enough to meet the Florida state standards of a minimum of 24 inches above the high water ground elevation.

Wastewater flow associated with the septic systems has never been metered; therefore, estimates of sewage flows are made on the amount of water used and/or the number of people being served (approximately 70 park staff and families and approximately 186,000 visitors per year who visit the Ernest F. Coe Visitor Center).

A new potable water treatment system has recently been developed for the Pine Island developed area. Since no irrigation or other significant consumptive water use is prevalent at either site, the volume of potable water used should essentially be equal to the volume of sewage produced. Therefore, the same design flows used for the water treatment plant would be used for any new wastewater treatment system. Table 2 presents the volume of flow for the wastewater treatment plant.

TABLE 2: VOLUME OF FLOW – WASTEWATER TREATMENT PLANT*

Pine Island average day, peak month- 4/1998	13,700 gallons
Headquarters average day, peak month – 3/1998	1,630 gallons
subtotal	15,330 gallons
25% Future increase in demand	3,833 gallons
25% Design safety factor	4,791 gallons
total	23,954 gallons
PEAK MONTH AVERAGE DAILY WATER DEMAND (PMADWD)	25,000 gallons per day
MAXIMUM DAILY WATER DEMAND = 1.5 X PMADWD	37,500 gallons per day
MAXIMUM HOURLY WATER DEMAND = 4 X PMADWD	69 gallons per minute

*(Pine Island Value Analysis, Package 191C, Denver Service Center, NPS, 2002)

The above figures would be for a combined headquarters and Pine Island plant. Separate PMADWD flows for each area would be 13,700 gallons per day for Pine Island and 1,630 gallons per day for headquarters.

Visitation varies significantly at the Ernest F. Coe Visitor Center. The increased visitation in the winter season would result in greater wastewater flow volumes being delivered to the treatment plant during high visitation months.

The wastewater currently produced at Pine Island and headquarters has never been tested, but can be assumed to be typical domestic sewage; no unusual type of discharges into the collection system are anticipated. Under this "continued current management" alternative, a car wash at Pine Island would be connected to the system, but it is estimated that an average of only 2 or 3 vehicles per day would be washed there, which would not be significant.

Alternative B: The Preferred Alternative

Alternative B has been identified as the preferred alternative because it meets the objectives associated with the purpose and need for the proposed action and is the environmentally preferred alternative.

The existing Pine Island and headquarters/visitor center collection lines, septic tanks, and drainfields would be abandoned, in accordance with pertinent codes, under this alternative.

A new wastewater collection system, package treatment plant, effluent discharge transmission lines and two new raised infiltration beds would comprise the preferred alternative wastewater system for the Pine Island area (see Figure 4). The footprint of this new system would cover an area of approximately 3.0 acres. A new system of collection lines would connect all facilities within the project area, including each individual housing unit, the park entrance station, and headquarters/visitor center complex to one new treatment plant (see Figures 5 and 6). This action would require approximately 2,000 feet of new collection lines and 7,500 feet of transmission

lines. Trenching would be done in previously disturbed park road shoulders and driveways, where possible. The trenching for the new collection lines would require a 4 foot wide trench at a depth of 3 feet, causing some new soil disturbance where the fill that comprises most of the Pine Island area is less than 3 feet in depth. Installation of the wastewater conveyance would require about 1 acre of surface disturbance. Because of the flat topography in the area, the collection/transmission lines would be pressurized by installation of pump stations and force mains. This would ensure proper movement of raw wastewater from the sources to the new treatment facility.

The NPS has selected a membrane biological reactor (MBR) treatment system, which has been proven to meet the anticipated discharge requirements. The wastewater plant would be designed to treat phosphorus to 100 parts per billion. However, if more stringent limits are set in the future by the Florida Department of Environmental Protection, then the NPS would provide additional treatment options to reach as low as 10 parts per billion total phosphorus discharge at the compliance point. Sludge would be pumped out periodically and disposed of in a licensed wastewater treatment plant in Miami-Dade County.

The new package wastewater treatment plant, designed to treat up to 30,000 gallons per day, would occupy approximately 2,200 square feet (0.05 acres) and be located on a previously disturbed site adjacent to and just south of the existing Recycle Building (see Figures 2 and 4). The placement of the wastewater treatment plant would avoid wetlands and pinelands. The existing access road to this new facility would be gated, providing NPS administrative access only.

A new effluent discharge line (approximately 3,960 feet in length) from the new treatment plant near the Recycle Building would be trenched along the abandoned 1000 foot airstrip access road (previously disturbed area) and discharged into two new raised infiltration beds (see Figure 4). Following installation of the discharge line, the 1000 foot access road from the Recycle Building to the abandoned airstrip would be retained at its present width as a gravel road, but rehabilitated (grading and additional gravel) to provide reliable park monitoring/maintenance access.

Two new raised infiltration beds/berm (each approximately one acre in size) would be located on the southeasterly portion of the abandoned airstrip (previously disturbed area), avoiding direct impact to wetlands and pinelands. The infiltration beds (percolation ponds) would be limestone placed on top of existing grade. This would require removal of up to 4 inches of disturbed surface material in preparation for the new fill. There will be an approximately 2 foot deep trench for transmission pipes excavated to each of the infiltration beds. Public entry to the airstrip and raised infiltration beds will be blocked by a gate on the airstrip access road. Signs will also be posted to prohibit visitor (hiker) use of the area.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Director's Order #12 (NPS 2001b), the National Park Service is required to identify the "environmentally preferred alternative" in all environmental documents, including environmental assessments. The environmentally preferred alternative is determined by applying the criteria suggested in the 1969 National Environmental Policy Act, which is guided by the Council on Environmental Quality. The Council on Environmental Quality provides direction that "the environmentally preferred alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of the National Environmental Policy Act, which considers the following criteria:

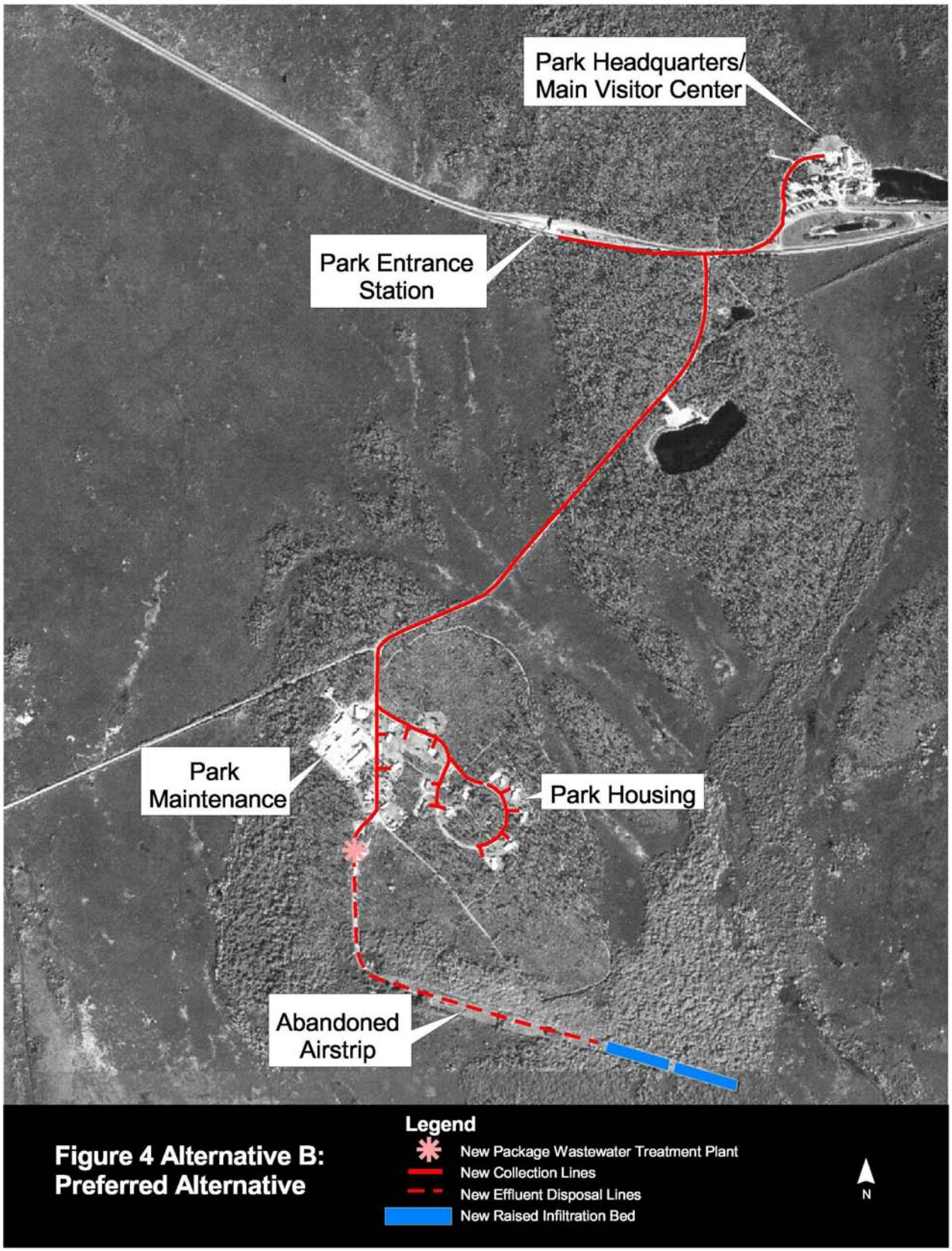

Figure 4 Alternative B: Preferred Alternative

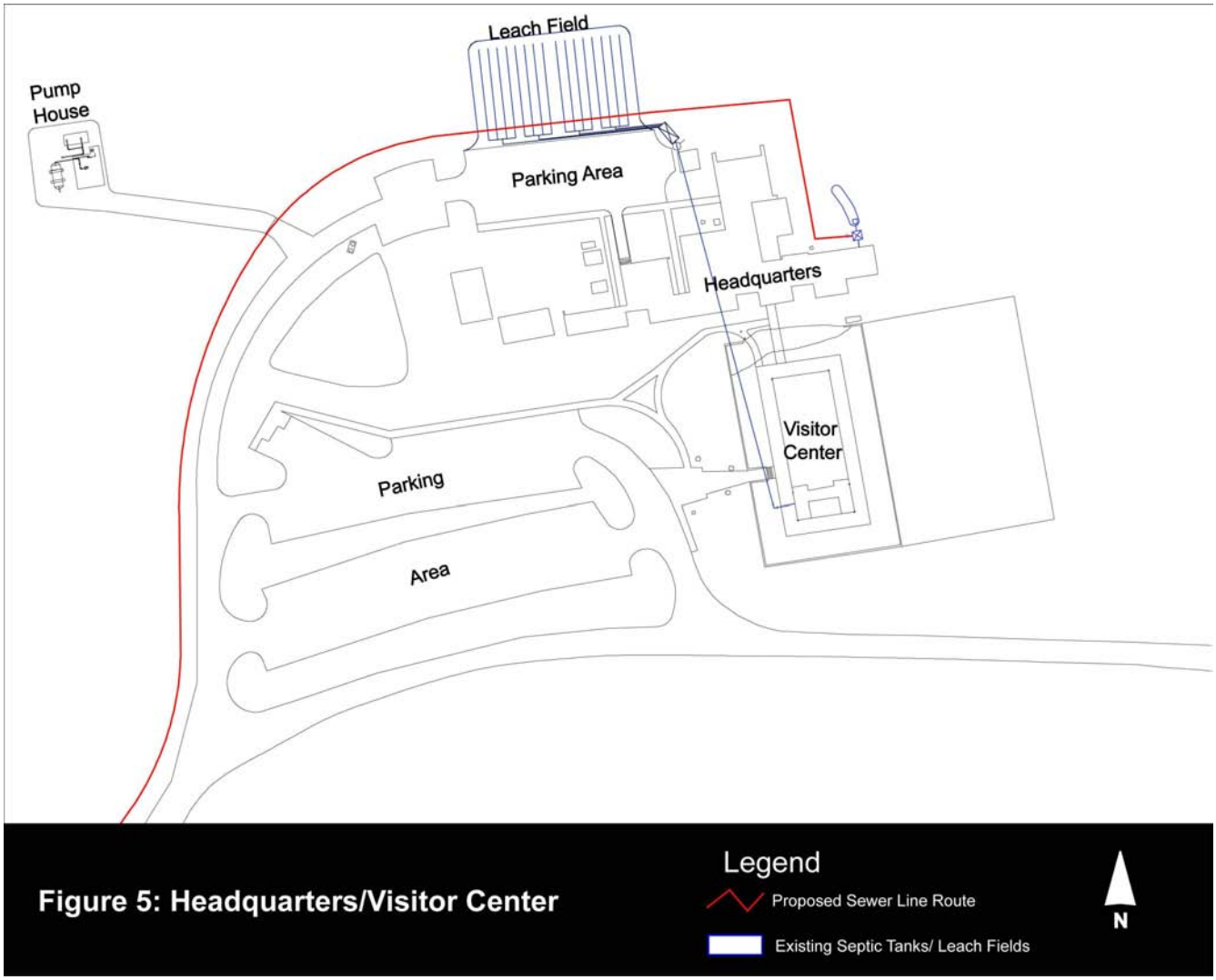

Figure 5: Headquarters/Visitor Center

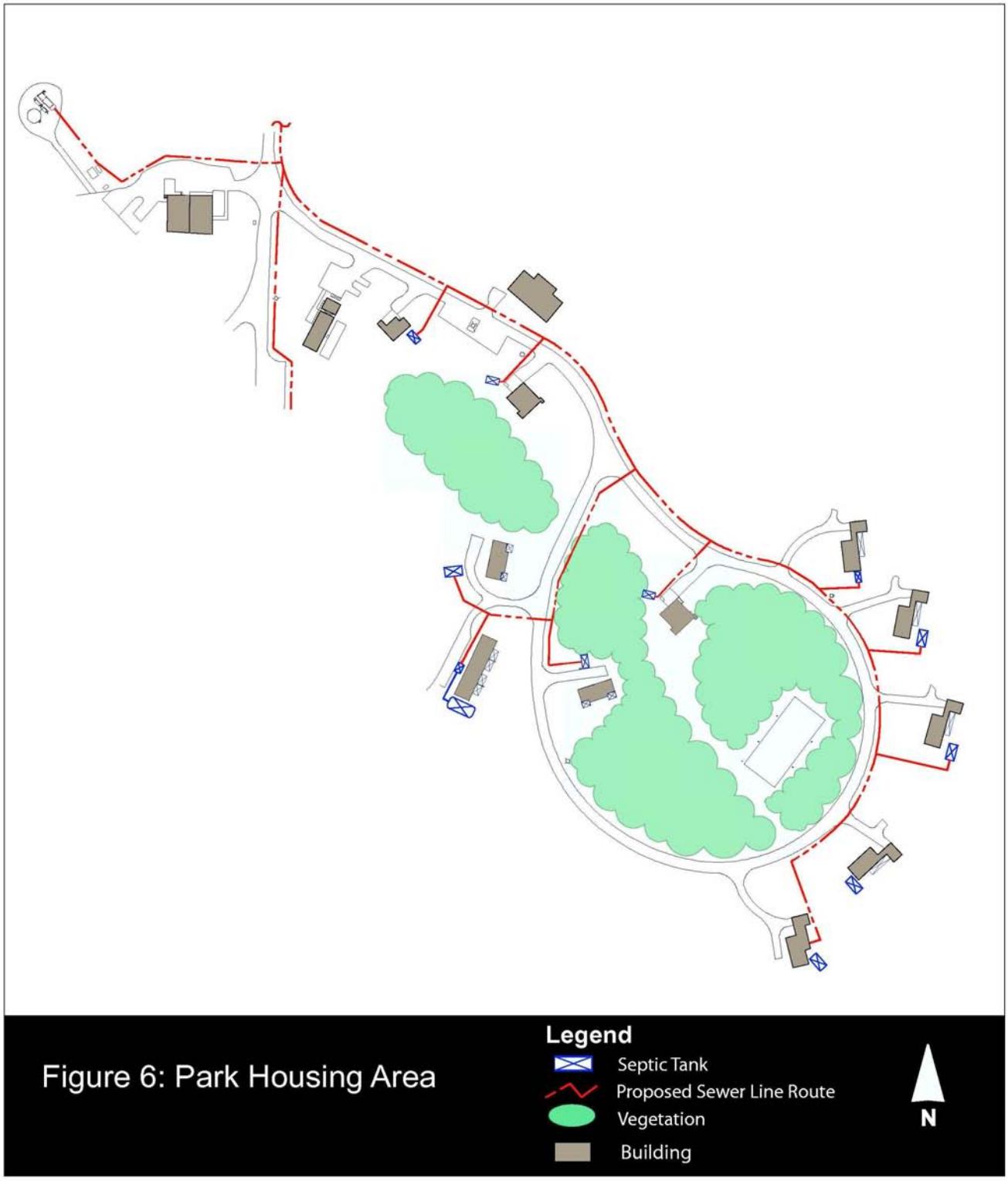

Figure 6: Park Housing Area

1. fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;

2. assuring for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

3. attaining the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

4. preserving important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;

5. achieving a balance between population and resource use which would permit high standards of living and a wide sharing of life's amenities; and

6. enhancing the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

The environmentally preferred alternative for the proposed Pine Island Wastewater System Improvements project is based on applying these national environmental policy goals to the evaluation and decision-making processes.

The preferred alternative would attain the widest range of beneficial uses of the environment, biological resource protection, visitor safety and enjoyment, and cultural resource protection, without degradation of resources. Specifically Alternative B, the preferred alternative, meets the criteria for the environmentally preferred alternative by ensuring:

> a higher level of health and safety for visitors and park employees as compared to the no action alternative by providing a dependable wastewater system that would meet all federal, state, and local health standards (Criterion 2 & 3);
>
> the reduction of nitrogen and phosphorus, minimizing the adverse effect of wastewater effluent on groundwater, surface waters, and surrounding wetlands that are critical to the functioning of this sensitive ecosystem (Criterion 4);
>
> that the effluent discharge has a minimum adverse effect on park resources that are critical to the diversity of plant and animal life associated with this internationally significant resource (Criterion 4); and
>
> that the National Park Service is better able to achieve its long range mission goal of providing a balance between human use and benefits while at the same time protecting the park's groundwater, surface waters, and surrounding wetlands that are vital to the park's long term survival (Criterion 1 & 5).

The no action alternative would not provide a long-term, reliable wastewater treatment system that would consistently meet federal, state, and local standards. Under the no action alternative, resource impacts, especially on groundwater, surface water, and wetlands, might be expected to increase with the continued deterioration of the existing wastewater treatment system. Also, the increased maintenance expected with continued use of the existing water treatment system would

have long-term adverse impacts on park operations. Thus the no action alternative does not meet national environmental policy goals as well as the preferred alternative.

GENERAL CONSTRUCTION SCHEDULE AND COSTS FOR THE PREFERRED ALTERNATIVE

The award design/build contract for this project is scheduled for June 2003, following the completion and approval of the environmental assessment and "Finding of No Significant Impact" (FONSI). It is estimated that the design process would occur between June and August, 2003 with the one year construction period beginning in September/October 2003.

Assuming the wastewater plant treats phosphorus to the 100 parts per billion level, the estimated (Class B estimate) net cost of construction would be $3,309,999. If the more stringent standard of 10 parts per billion for phosphorus is required by the state, then the net construction costs would require an additional $510,000.

MITIGATION MEASURES

Best management practices and mitigation measures would be used to prevent or minimize potential adverse effects associated with the proposed action alternative. These practices and measures would be incorporated into the project construction documents and plans to ensure that major adverse impacts would not occur. Mitigation measures undertaken during project implementation would include, but not strictly be limited to, those listed in Table 3.

TABLE 3: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

Potential Adverse Effect	Mitigation Measure or Best Management Practice
Direct effects from construction activities	Protection of all construction areas to confine potentially adverse activities to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications, and workers would be instructed to avoid conducting activities beyond the construction zone.
Erosion resulting from construction-related surface disturbance	The contractor would be required to control erosion prior to, during and following ground disturbing activities. Standard erosion control measures would be used to minimize soil erosion. Erosion barriers would be inspected and maintained regularly to ensure effectiveness. The primary measure used to control stormwater runoff would be installation of temporary silt fencing. Silt fences are made of synthetic fabric and are placed in drainage contours to trap sediments generated during construction.
Construction would affect areas previously undisturbed	Construction activities would take advantage, where possible, of sites where previous disturbance has already had adverse effects.
Contamination of soil by petrochemicals from construction equipment and maintenance of wastewater treatment system	Areas used for equipment maintenance and refueling would be minimized, and surface runoff in these areas would be controlled. Equipment would be checked frequently to minimize leaks and potential contamination. All chemicals used in the wastewater treatment process would be transported, stored, and used following federal, state, and local regulations and standards.
Direct effects from construction and operation of new wastewater system on threatened and endangered species, wildlife, and habitat	All construction personnel would be advised of the potential presence of the Florida panther to avoid disturbance or injury to this federally endangered species. The park would use its best professional judgment in applying standard protection measures for the federally listed, threatened Eastern indigo snake (see Appendix D).

TABLE 3: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

Potential Adverse Effect	Mitigation Measure or Best Management Practice
Wildlife disturbance resulting from construction activities, including noise	To reduce potential impacts on wildlife, construction activities occurring near sensitive habitats would be scheduled to minimize potential impacts during periods of breeding, nesting and rearing of young. Construction would occur only during daylight hours to reduce effects on nocturnal foraging or rest.
Direct effects from construction and operation of new wastewater system on the visitor experience and park staff	To lessen adverse effects on the visitor experience, construction information would be posted in strategic locations and made available on the park's website. Construction would utilize a rotation system to minimize disruption of visitor access and use of the Pine Island developed area. Where possible, all construction activities would be timed to avoid high visitor use periods. In the design stage, every effort would be made to buffer the noise generated by the wastewater plant blower and generator to minimize the effect on the park staff housing area.
Protection of cultural resources	To determine the levels of previous disturbance, to avoid damage to previously unknown archaeological resource, and to determine if original fabric from the Ingraham Highway remains in areas where it might be impacted by project construction, the Southeast Archaeological Center will conduct archaeological survey and testing activities in previously undisturbed areas prior to ground disturbing activities. If any resources are encountered, adequate mitigation of project impacts (in consultation with appropriate agencies) or adjustment of the project design will take place to avoid or limit the adverse effects on prehistoric and historic archaeological resources. Avoid known historic structures and archaeological sites, whenever possible. If avoidance is not possible, mitigate impacts through salvage and documentation, as appropriate. Educate personnel about the nature of the cultural resources at the project site and the need for protection. Monitor construction activities and include stop-work provisions in construction documents should archaeological or paleontological resources be uncovered.
Discovery of unknown archeological resources or human remains	If previously unknown archaeological resources are discovered, work will be stopped in the area of any discovery and the park would consult with affiliated tribes, the National Park Service Southeast Archaeological Center, the State Historic Preservation Officer and the Advisory Council on Historic Preservation, as appropriate.
Visitor experience	Prepare bulletins to educate visitors on the purpose of projects.
Public health and safety	Enforce "no entry" zone currently associated with the park housing/maintenance area. Provide traffic flow control, signage and flagging to protect visitor and staff safety during construction activities.
Disturbance of state-listed plant species	In construction areas near state-listed plant species; identify, flag and avoid these species to eliminate potential adverse effects.

TABLE 3: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

Potential Adverse Effect	Mitigation Measure or Best Management Practice
Floodplains and wetland impacts	Locating the two new raised infiltration beds as far from surface waters as possible would reduce potential impacts to Outstanding Florida Waters. Abandoning the existing septic tanks and drainfields would reduce direct disturbance of the floodplain by removing the need for long-term maintenance and stop the leaching of insufficiently treated effluent into groundwater. However, because the wastewater treatment plant components will be elevated above the base flood level, the risk to property can be reduced through mitigation but cannot be eliminated. The new pumping stations, force mains, and sewer mains would be located below ground and properly embedded to minimize damage from surface erosion, debris and flooding. To improve the protection of park property a wastewater treatment plant hurricane hazard plan would be developed. This plan will address pre- and post-hurricane preparedness measures in accordance with the *Hurricane Preparedness for Domestic Wastewater Treatment Plants* guidelines established by the Florida Department of Environmental Protection. The National Park Service will continue to operate these facilities using the Everglades National Park Hurricane Plan, an operational hazard implementation plan that lowers the threat to life and property. This plan is coordinated with the Miami-Dade, Collier and Monroe County Departments of Emergency Management. The plan is reviewed and updated annually to ensure maximum human safety.

ALTERNATIVES CONSIDERED BUT REJECTED

Individual Mound Systems

The alternative for constructing a new system of individual mounded drainfields for the Pine Island/Headquarters/Visitor Center area was considered but rejected because it would require imported fill material and would not provide for nutrient removal. This alternative would result in up to 4 foot mounds and would require additional pumps at the septic tank outlets since the drainfield lines would be too high for gravity flow. Also, with the limited space around headquarters, a mounded drainfield would have to extend beyond the existing fill area footprint into previously undisturbed vegetation (NPS 2001c). The cost estimate for this alternative was approximately $1,481,250 (NPS 2002).

Separate Wastewater Treatment Plants for Pine Island and Headquarters/Visitor Center

This option proposes a separate package treatment plant at each of the two sites with either separate on-site effluent disposal (raised infiltration bed) or a centralized effluent disposal (raised infiltration bed), the latter requiring 3,000 feet of force main. This alternative was rejected because of the lack of space near the headquarters/visitor center site when considering placement of both a new package wastewater treatment plant and a new raised infiltration bed(s). The cost estimate for this alternative was approximately $5,837,500 (NPS 2002).

Wastewater Treatment Plant Adjacent to the Borrow Pit with the Conversion of the Borrow Pit Pond to a Raised Infiltration Bed

This alternative was considered but rejected because of the potential major adverse effect it would have on the endangered Florida panther. This alternative would require that 86,400 cubic yards of fill (72,000 yards of soil + 14,400 cubic yards of organic debris) be taken from the Hole-in-the Donut in Everglades National Park to fill in the borrow pit pond for conversion to a raised infiltration bed. Approximately, 2,400 truck loads of fill would be required to fill the borrow pit. Increased truck traffic along this 8 mile section of park road would greatly increase the chances of panther mortality (Norland pers. comm. 2002).

This fill operation was also deemed economically infeasible because it would increase project costs by $767,764 and could not be implemented in a timely manner.

In addition, a pavement analysis conducted in 1999 for the Hole-in-the-Donut project concluded that hauling operations for this fill would cause severe damage to park roads unless protective measures (adding an extra layer of asphalt before hauling and a leveling course at the conclusion of hauling) were taken to mitigate the action. It was determined that approximately $1.8 million in additional funds would be required to cover the costs of protecting 8 miles of park roads and 16 drainage structures from this hauling operation, as well as the required repair following hauling (Norland pers. comm. 2002). When combining the costs of providing fill for the borrow pit ($767,764); repaving roads and replacing drainage structures ($1,800,000); and the estimated costs of the central wastewater treatment plant ($2,237,500)—the total cost for this project would be approximately $4,805,264 (NPS 2002). The park has estimated that it would take until 2010 at the earliest to receive additional funds for this project (Culhane pers. comm. 2002).

Pump Untreated Wastewater to a Miami-Dade County Treatment Facility (Connection at the Intersection of Florida State Road 9336 and Tower Road)

The cost of developing a transmission system and numerous lift stations from the park to a Miami-Dade County facility would be expensive at a cost of $14,285,000 (Lynn pers. comm. 2002). Also, because approximately 50 miles of the new collection system/sewer main would be inside the park, the trenching and the potential for sewage spills would have both short- and long-term potential for adverse impacts to this sensitive wetlands ecosystem. The alternative would also have the potential for encouraging commercial and residential development on prime agriculture lands adjacent to the park. Besides the high construction costs, this alternative would require extensive interaction and negotiation with Miami-Dade County, and the National Park Service would have to surrender control over the final effluent water quality and reclamation method.

Dispose of Wastewater Effluent via Deep Well Injection

Deep well injection for the Pine Island wastewater treatment system effluent would be expensive ($4-5 million) and has an unknown probability of success. Deep well injection requires locating a confinement layer that seals off wastewater from groundwater aquifers. There is always the possibility that a confinement layer might not be located, which would also result in a total loss of expenditures. The permitting for deep well injection is also complicated and controversial due to the potential for long-term aquifer contamination.

Reuse of Wastewater Effluent

Another park project which has recently undergone environmental analysis is the Flamingo Potable Water System Improvements (see description in “Other Projects and Plans”). The approved action for this project involves reverse osmosis which will require the discharge of concentrated brine into the environment. This brine discharge is expected to cause minor to moderate adverse effects on vegetation and wetlands. During public review of the environmental assessment for this project, some reviewers raised the possibility of reuse of treated wastewater, in order to reduce potable water demand and thereby reduce the quantity of brine discharge. The applicable regulation pertaining to this matter is Florida Administrative Code (FAC) Rule 62-610, Part III, Slow-Rate Land Application Systems; Public Access Area, Residential Irrigation, and Edible Crops.

As discussed in the rule, there are a number of potential uses for reused water. For both the Flamingo project and this current Pine Island project, these uses were individually determined not to be viable as explained below. These potential uses have their own environmental impacts, such as facility construction and the trenching of new distribution piping, which would need to be further analyzed.

Landscape irrigation: The landscape in Pine Island is not irrigated. Therefore, wastewater reuse for this purpose would not lower potable water demand. This area already receives a high amount of rainfall, and irrigation would increase the growth rate of the lawns, thereby increasing maintenance costs associated with mowing.

Vehicle washing: One facility for washing vehicles does exist in Pine Island; however, the quantity of water used for such cleaning is considered insignificant, and discharge of reused water would not be permitted to surface waters (Outstanding Florida Waters).

Fire protection (hydrants and building sprinklers): Fire flows are rare, and potential water savings are negligible.

Flushing of sanitary sewers, and cleaning of roads, sidewalks, and outdoor work areas: A program for the flushing of sanitary sewers does not exist in Pine Island. Water use for the cleaning of roads, sidewalks, and outdoor work areas is either non-existent or negligible.

Toilet flushing: Although employee housing, headquarters, and the main park visitor center could be retrofitted for wastewater reuse, the number of visitors and employees is highly seasonal and is minimal to zero for many months of the year. Additionally, the costs associated with converting toilets for wastewater reuse are substantial.

Construction of "Living" Wastewater Treatment System

Living systems or "green" type wastewater treatment systems were discussed but dismissed. The primary reason for dismissal was that a living treatment facility or a constructed wetland system type of process would not be able to reduce the level of pollutants (particularly phosphorus) down to acceptable levels as required for Outstanding Florida Waters and the Everglades Forever Act. Meeting or exceeding these standards is a requirement of the project in order to protect nutrient-sensitive wetlands from adverse impacts. In addition to not meeting required discharge standards, a reconstructed wetlands treatment would require a considerable amount of space due to the lower rates at which they degrade wastes when compared to a package type of treatment facility and raised infiltration beds. Locating the wastewater treatment system within previously disturbed areas is a project goal.

HOW THE ALTERNATIVES MEET THE OBJECTIVES OF THE PROPOSED ACTION

Alternative A, the no action alternative, would not meet the project objectives. Potential adverse impacts to water resources could be expected due to the continued use of the aged septic/drainfield treatment system. There is also potential that federal, state, and/or local standards would not be met.

Alternative B, the proposed action, would meet the project objectives because it would result in the installation of a new collection line system, package wastewater treatment plant, effluent disposal lines, and raised infiltration beds. The proposed action would:

Improve wastewater treatment at Pine Island to meet Florida Department of Environmental Protection standards.

Minimize the impact on park resources by designing a wastewater treatment system that utilizes technologies to ensure that the system meets or exceeds established legal standards commensurate with the stewardship of this internationally significant protected area.

Ensure that the effluent from this wastewater system is disposed of in an environmentally sound manner.

Utilize existing surface disturbance to the greatest extent possible.

Ensure that construction and operation of the improved wastewater treatment system does not adversely impact threatened and endangered species, especially with regard to surface disturbance-related impacts.

Increase the life span and efficiency of the wastewater treatment system.

Minimize adverse impacts to visitors and park staff.

Utilize efficient and cost-effective actions in achieving the purpose and objectives of the project.

COMPARISON OF ALTERNATIVE EFFECTS

The terms used to define the magnitude or intensity of the effects (e.g., negligible, minor) are described below in Table 4. Table 5 compares and contrasts the alternatives, including the degree to which each alternative accomplishes the purpose or fulfills the need identified in the "Purpose and Need" section. Table 6 presents a summary comparison of the effects of the alternatives based on the evaluations of the impact topics in the "Environmental Consequences" section of this environmental assessment.

TABLE 4: IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Hydrology and water quality	Impacts would not be detectable. Water quality parameters would be well below all water quality standards for the designated use of the water. Both quality and quantity of flows would be within historical conditions.	Impacts would be measurable, but water quality parameters would be well within all water quality standards for the designated use. Both quality and quantity of flows would be within the range of historical conditions, but measurable changes from normal flows would occur. State water quality and antidegradation policy would not be violated.	Changes in water quality or hydrology would be readily apparent, but water quality parameters would be within all water quality standards for the designated use. Water quality or flows would be outside historic baseline on a limited time and space basis. Mitigation would be necessary to offset adverse effects, and would likely be successful. State water quality and antidegradation policy would not be violated.	Changes in water quality or hydrology would be readily measurable, and some quality parameters would periodically be approached, equaled, or exceeded. Flows would be outside the range of historic conditions, and could include flow cessation or flooding. Extensive mitigation measures would be necessary and their success would not be assured. State water quality regulations and antidegradation policy may be violated.	Short-term - Following implementation activities, recovery would take less than one year Long-term - Following implementation activities, recovery would take longer than one year
Floodplains and wetlands	Wetlands or floodplains would not be affected, or effects to the resource would be below or at the lower levels of detection. No U.S. Army Corps of Engineers 404 permit would be necessary.	The effects to wetlands or floodplains would be detectable and relatively small in terms of area and the nature of the change. A U.S. Army Corps of Engineers 404 permit would not be required.	The alternative would result in effect to wetlands or floodplains that would be readily apparent, such that a U.S. Army Corps of Engineer 404 permit could be required.	Effects to wetlands or floodplains would be observable over a relatively large area, and would require a U.S. Army Corps of Engineers 404 permit. The character of the wetland or floodplain would be substantially changed.	Short-term - Following implementation, recovery would take less than one year Long-term - Following implementation, recovery would take longer than one year

TABLE 4: IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Soils	Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight.	The effects to soils would be detectable. Effects to soil productivity or fertility would be small, as would the area affected. If mitigation was needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.	The effect on soil productivity or fertility would be readily apparent, and result in a change to the soil character over a relatively wide area.	The effect on soil productivity or fertility would be readily apparent, and substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive and their success would not be guaranteed.	Short-term – Effects only during project implementation activities Long-term – Effects extend beyond project implementation activities
Vegetation	Individual native plants may occasionally be affected, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.	Effects to native plants would be measurable or perceptible, but would be localized within a small area. The viability of the plant community would not be affected and the community, if left alone, would recover.	A change would occur to the native plant community over a relatively large area that would be readily measurable in terms of abundance, distribution, quantity, or quality. Mitigation measures to offset/minimize adverse effects would be necessary and would likely be successful.	Effects to native plant communities would be readily apparent, and would substantially change vegetative community types over a large area, inside and outside the park. Extensive mitigation would be necessary to offset adverse effects and their success would not be assured.	Short-term - Recovers in less than 1 year Long-term - Takes more than 1 year to recover

TABLE 4: IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Wildlife and aquatic life	Wildlife and aquatic life would not be affected or the effects would be at or below the level of detection and would not be measurable or of perceptible consequence to wildlife populations.	Effects to wildlife and aquatic life would be measurable or perceptible, but localized within a small area. While the mortality of an individual animal might occur, the viability of wildlife populations would not be affected and the community, if left alone, would recover.	A change in wildlife and aquatic life would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity, or quality of population. Mitigation measures would be necessary to offset adverse effects, and they would likely be successful.	Effects to wildlife and aquatic life would be readily apparent, and would substantially change wildlife populations over a large area in and out of the national park. Extensive mitigation would be needed to offset adverse effects, and its success could not be assured.	*Plants*: Short-term - Recovers in less than 1 year Long-term - Takes more than 1 year to recover *Animals*: Short-term - Recovers in less than 1 year Long-term - Takes more than 1 year to recover
Endangered, threatened, and protected species, and critical habitats	No Effect: Impacts would not affect listed or protected species or designated critical habitat.	May Affect/Is Not Likely to Adversely Affect: Effects on special status species would be discountable (i.e., adverse effects are unlikely to occur or could not be meaningfully measured, detected, or evaluated) or completely beneficial.	May Affect/Likely to Adversely Affect: Adverse effects to a listed species might occur as a result of the proposed action and the effect would either not be discountable or completely beneficial. Moderate impacts to species would result in a local population decline due to reduced survivorship, declines in population, and/or a shift in the distribution; no casualty or mortality would occur.	Likely to jeopardize the continued existence of a species/Adversely modify critical habitat: Effects could jeopardize the continued existence of a listed or proposed species or adversely modify designated critical habitat within and/or outside the park boundaries. Major impacts would involve a disruption of habitat and breeding grounds of a protected species such that casualty or mortality would result in removal of individuals of a protected species from the population.	Short-term – Effects only during project implementation activities Long-term – Effects extend beyond project implementation activities

TABLE 4: IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Soundscape	Natural sound environment would not be affected or the effects would be at or below the level of detection, and the changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience or to biological resources.	Effects to the natural sound environment would be detectable, although the effects would be localized, and would be small and of little consequence to the visitor experience or to biological resources. Mitigation measures, if needed to offset adverse effects, would be simple and successful.	Effects to the natural sound environment would be readily detectable and localized, with consequences at the regional or population level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.	Effects to the natural sound environment would be obvious, and would have substantial consequences to the visitor experience or to biological resources in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.	Short-term – Effects only during project implementation activities Long-term – Effects extend beyond project implementation activities
Cultural Resources	The effect is at the lowest levels of detection– barely perceptible and not measurable.	Archaeological resources—the impact affects an archeological site(s) with modest data potential and no significant ties to a living community's cultural identity. National Register properties—the impact does not affect the character-defining features of a National Register of Historic Places eligible or listed structure, site, district, or cultural landscape.	Archeological resources—the impact affects an archeological site(s) with high data potential and no significant ties to a living community's cultural identity. National Register properties—the impact changes a character defining feature(s) of the eligible or listed structures, sites, districts, or cultural landscapes, but does not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized.	Archaeological resources—the impact affects an archeological site(s) with exceptional data potential or that has significant ties to a living community's cultural identity. National Register properties—the impact changes a character defining feature(s) of a National Register eligible or listed structure, site, district, or cultural landscape, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register.	Short-term - Effects on the natural elements of a cultural landscape may be comparatively short-term (e.g., 3 to 5 years) until new vegetation grows or historic plantings are restored. Long-term - Because most cultural resources are non-renewable, any effects on archeological, historic, or ethnographic resources, and on most elements of a cultural landscape, would be long-term.

TABLE 4: IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Public health and safety	Public health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on the public health or safety.	The effect would be detectable, but would not have an appreciable effect on public health and safety. If mitigation were needed, it would be relatively simple and likely successful.	The effect would be readily apparent, and would result in substantial, noticeable effects to public health and safety on a local scale. Changes in disease rates or injury could be measured. Mitigation measures would probably be necessary and would likely be successful.	The effects would be readily apparent, and would result in substantial, noticeable effects to public health and safety on a regional scale. Changes could lead to mortality. Extensive mitigation measures would be needed, and their success would not be guaranteed.	Short-term – Effects only during project implementation activities Long-term – Effects extend beyond project implementation activities
Visitor use and experience	Visitors would not be affected, or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.	Changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.	Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.	Changes in visitor use and/or experience would be readily apparent and have important consequences. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.	Short-term – Effects occur only during project implementation activities Long-term – Effects extend beyond project implementation activities
Wilderness	A change in wilderness character could occur, but it would be so small that it would not be of any measurable or perceptible consequence.	A change in wilderness character and associated values would occur, but it would be small and, if measurable, would be highly localized.	A change in the wilderness character and associated values would occur. It would be measurable, but localized.	A noticeable change in the wilderness character and associated values would occur. It would be measurable, and would have a substantial or possibly permanent consequence.	Short-term – Effects occur only during project implementation activities Long-term – Effects extend beyond project implementation activities

TABLE 4: IMPACT TOPIC THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Park operations	Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.	The effect would be detectable but would be of a magnitude that would not have an appreciable adverse or beneficial effect on park operations. If mitigation were needed to offset adverse effects, it would be relatively simple and likely successful.	The effects would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.	The effects would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed.	Short-term – Effects occur only during project implementation activities Long-term – Effects extend beyond project implementation activities

TABLE 5: COMPARATIVE SUMMARY OF ALTERNATIVES AND EXTENT TO WHICH EACH ALTERNATIVE MEETS THE PROJECT OBJECTIVES

Alternative A – No Action	Alternative B – Preferred Alternative
The no action alternative, with continuing use of the existing septic tank/drainfield system, would not provide a long-term, reliable wastewater treatment system that would consistently meet current federal, state, and local standards. Under the no action alternative, potential resource impacts, especially on groundwater, surface water, and wetlands, might be expected to increase with the continued deterioration of the existing wastewater treatment system. Also, the increased maintenance expected with continued use of the existing wastewater treatment system would have long-term adverse effects on park operations. Thus, the no action alternative does not meet national environmental policy goals as well as the preferred alternative. **Does Project Meet Objectives?** No. Continuing the existing conditions would not provide a long-term, reliable wastewater system that would consistently meet current federal, state, and local standards, and potential adverse effects would continue to threaten groundwater and wetlands, as well as having potential adverse effects on visitors and park staff.	**The preferred alternative** of providing a new wastewater treatment plant, collection/effluent disposal lines, and two raised infiltration beds for the Pine Island area would attain the widest range of beneficial uses of the environment, biological resource protection, visitor safety and enjoyment, and cultural resource protection, without degradation of resources. Specifically, Alternative B would provide a higher level of health and safety for visitors and park employees when compared to the no action alternative by providing a dependable wastewater system that would consistently meet all federal, state, and local standards. The new wastewater treatment plant design would ensure the reduction of nutrients to Florida Department of Environmental Protection standards, providing for a safe, efficient, reliable, and environmentally sound wastewater system. The new collection system piping and effluent disposal (raised infiltration beds) would eliminate the discharge of insufficiently treated effluent into the groundwater system that would continue to occur under the no action alternative. Also, the new wastewater treatment system would ensure a reduction of nitrogen and phosphorus from plant effluent that would have a beneficial impact on the groundwater and surrounding wetlands. **Does Project Meet Objectives?** Yes. The preferred alternative would provide a long-term solution to Pine Island's wastewater treatment problem, allowing the widest range of beneficial uses of the environment, biological resource protection, visitor safety and enjoyment, and cultural resource protection, without degradation of resources.

TABLE 6: COMPARISON OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative A: No Action/Continue Current Management	Alternative B: Preferred Alternative
Hydrology and water quality	Under the no action alternative, septic system effluent would continue to be discharged into local groundwater. The potential for contaminants to reach local groundwater would produce localized, negligible to minor, long-term, adverse effects. These impacts would result from possibly exceeding state water quality criteria.	Under the preferred alternative, the septic systems would be abandoned and wastewater would be centrally treated, collection/transmission lines would be constructed (a minimum of 24 inches above the water table), and effluent released into new raised infiltration beds (also 24 inches above the water table). This would reduce the local water quality impacts and result in long-term, minor, beneficial effects. Increased erosion during construction activities could have adverse effects on local surface water quality. Appropriate mitigation measures would be used, and these effects would be short-term, minor, and highly localized. The possibility of lateral movement of effluent leakage through the berm at the raised infiltration beds would be investigated and, if confirmed, actions would be taken to correct this leakage to prevent impact to surface waters.
Floodplains and wetlands	The no action alternative would likely result in long-term, localized, negligible to minor, adverse effects to adjacent wetland environments. Changes to the wetland could be due to the input of nitrogen and phosphorus contained in wastewater discharged from the existing septic systems. The continued presence of multiple septic treatment systems and drainfields that are subject to flooding would result in long-term, negligible to minor, adverse effects on the local floodplain.	Under the preferred alternative, the new wastewater treatment system would provide beneficial impacts to wetlands and floodplains of Pine Island. The reduced nutrient levels within the treated effluent discharged into properly constructed raised infiltration beds would result in long-term beneficial effects to wetlands of negligible to minor intensity. The presence of the new package plant and raised infiltration beds in the Pine Island developed area would have a negligible adverse contribution to flood hazards in the Pine Island floodplain. The disturbance generated by construction activities would result in short-term, adverse effects of negligible intensity.
Soils	Impacts to soils resulting from the no action alternative would be long-term, negligible, adverse, and localized. These impacts would be due to the continued maintenance of, and limited nutrient discharges from, aging septic systems. Both factors would contribute to slight alterations of soil character and productivity.	The preferred alternative would result in long-term, negligible, local, beneficial effects to soils associated with the cessation of septic system maintenance activities, and limited nutrient discharge. Short-term, adverse, local, negligible impacts to soils would result from ground disturbance associated with construction.
Vegetation	Under the no action alternative, negligible to minor, adverse, short- and long-term, localized impacts to vegetation would result from the continued discharge of limited amounts of nutrients into the area surrounding the septic systems. Maintenance and repair of these systems would also continue and, as time passes, the frequency of repair would increase as the systems age.	The preferred alternative would result in long-term, localized, minor, beneficial effects related to the cessation of nutrient discharge from and maintenance of existing septic systems. This preferred alternative would also result in the permanent elimination of some exotic species from an existing disturbed area. This alternative would also result in short- and long-term, negligible, adverse impacts to vegetation due to ground disturbances associated with the construction and installation of the new wastewater treatment plant and subsequent mowing of the raised infiltration beds.

TABLE 6: COMPARISON OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative A: No Action/Continue Current Management	Alternative B: Preferred Alternative
Wildlife and aquatic life	Long-term, negligible to minor, adverse, localized impacts to wildlife would result from the sustained discharge from and continued maintenance of existing septic systems. Human presence during maintenance activities would result in the temporary avoidance or retreat from the area by wildlife.	The preferred alternative would result in negligible to minor, short-term, adverse effects to wildlife associated with the construction of the wastewater treatment plant and installation of associated collection and transmission lines. Wildlife would retreat from or avoid the project site during construction activities, and during subsequent use of the backup generator and maintenance of the raised infiltration beds.
Endangered, threatened, and protected species and critical habitats	The effects to endangered and threatened species under the no action alternative range from “no effect” to “may affect, not likely to adversely affect." The disturbance associated with routine maintenance and repair of the existing septic systems would be very small scale and of limited duration. Species that use these areas to forage could avoid the area during activities and return when repairs were complete.	The effects to endangered, threatened, and protected species under the preferred alternative range from “no effect” to “may affect, not likely to adversely affect." Additionally, there would be no adverse effects to designated critical habitats of any of these species. Raised infiltration bed management (vegetation removal and periodic scarification) would not be likely to affect any listed species. The limited amount of construction disturbance, and the fact that excavation is restricted to previously disturbed and developed areas, also reduces the potential for effects to threatened and endangered species.
Soundscape	The periodic pump-out of 32 septic tanks (once every five years), and the occasional noise associated with the infrequent use of equipment and maintenance activity associated with the repair of drainfield lines would have a short- and long-term, but negligible adverse effect on soundscape.	Noise generated from the construction of this new wastewater treatment system would have a short-term, negligible to minor adverse effect on the soundscape because the majority of the construction activity would occur in the park housing/maintenance area, which is located 1.1 miles from the visitor use area. However, in the short- and long-term, the noise associated with the construction and operation of this new wastewater treatment system would have a minor to moderate adverse effect on park staff living in the park housing area, due to the close proximity of the wastewater treatment plant and raised infiltration beds to the park staff housing area.

TABLE 6: COMPARISON OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative A: No Action/Continue Current Management	Alternative B: Preferred Alternative
Cultural Resources	Archaeological Resources—There are no previously recorded prehistoric or historic archaeological sites within the project area. The opportunity to locate new archaeological sites is eliminated with the no action alternative and there would be no impacts to archaeological resources.	Archaeological Resources—The level of development and previous disturbance makes adverse effects on archaeological resources unlikely. Under the preferred alternative, the project area would be surveyed for archaeological resources prior to construction. Work would be monitored and contracts would include work-stoppage provisions if resources were discovered. As a result, implementation of the preferred alternative could produce negligible adverse effects on the archaeological resources.
	Historic Structures—The section of the Ingraham Highway that has been incorporated into the park road system would not be impacted as a result of the implementation of the no action alternative.	Historic Structures—The Ingraham Highway is on the park's List of Classified Structures and is eligible for the National Register of Historic Places. Although portions of that structure in the project area were removed by the National Park Service in the 1960s, the entire 41 miles of the Ingraham Highway in the park is included in the draft National Register nomination. The project would not disturb those portions of the highway currently incorporated into the park's road system. It is possible, however, that subsurface features of the Ingraham Highway where it was removed are still present. Archaeological survey of the area prior to construction would include investigations of this area. Construction activities would be monitored and contracts would include work-stoppage provisions if resources were discovered. As a result, implementation of the preferred alternative could produce negligible to minor adverse effects on historic structures due to impacts to the Ingraham Highway.
	Cultural Landscapes—Although the park has not conducted a cultural landscape inventory, implementation of the no action alternative would have no adverse impacts on potential cultural landscapes.	Cultural Landscapes—Although the park has not conducted a cultural landscape inventory, this project will occur in a development zone of the park, with modern roads, housing units, an air strip and administrative buildings. Loss of vegetation from construction activities would be minor and short-term. Implementation of the preferred alternative would have no adverse effects on eligible or potentially eligible cultural landscapes.
	Ethnographic Resources—Although the park has not conducted an ethnographic resources inventory, implementation of the no action alternative would have no adverse impacts on potential ethnographic resources.	Ethnographic Resources—Although the park has not conducted an ethnographic resources inventory, this project would occur in a development zone of the park and there are no known ethnographic resources within the project area. Implementation of the preferred alternative could have negligible long-term adverse effects on ethnographic resources.
	Museum Collections—Implementation of the no action alternative would have no impact on existing museum collections. The discovery of new artifacts for the museum collection would be eliminated. Project documentation to be incorporated into the museum collection would provide a negligible beneficial effect.	Museum Collections—Implementation of the preferred alternative may have a minor beneficial effect for the museum collection if new artifacts are discovered or new information regarding construction techniques of the Ingraham Highway is discovered. Project documentation to be incorporated into the museum collection would provide a negligible beneficial effect.

TABLE 6: COMPARISON OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative A: No Action/Continue Current Management	Alternative B: Preferred Alternative
Public health and safety	Under the no action alternative the potential for groundwater to be contaminated by inadequate septic systems would persist. This could potentially impact park staff and visitors since this water is used as the potable water supply. The potential for contamination would be considered a long-term, minor, adverse and localized impact on public health and safety.	The reduced risk of human contact with water-borne pathogens would be considered a long-term, minor, beneficial impact of the preferred alternative. Conversely, negligible long-term, adverse impacts would arise from the increased risk to individuals tasked with wastewater treatment plant operation as they would be more likely to come in contact with these water-borne pathogens and hazardous chemicals used in the plant. In the short-term, increased accident potential within the proposed project area, resulting from fill delivery, would pose a minor, adverse impact to public health and safety.
Visitor use and experience	The no action alternative would have a short term, minor adverse effect on visitor use and experience due to the deteriorating condition of the existing septic systems and the resulting occasional restroom shutdowns that would be expected to occur at the main park visitor center. However, if frequent repairs or an extended time period were required, the park would have to use a less temporary solution for providing portable toilet facilities which would have a more long-term, minor to moderate adverse effect, creating a negative perception, diminishing what would have otherwise been a valuable visitor experience.	The preferred alternative would have a short-term, negligible adverse effect due to the minimal construction activity that would occur in the prime visitor use area and the diversion of construction traffic along the main visitor center's bypass road. The preferred alternative would have a long-term, moderate, beneficial effect on the visitor experience because the new wastewater treatment system (pump/collection line system, package wastewater treatment plant, effluent disposal lines, and raised infiltration beds) would ensure that the Pine Island developed area would be capable of providing an effective and reliable system that would meet the basic needs of visitors during their stay at the park.
Wilderness	Because there are no facilities expansion and no disturbance adjacent to designated wilderness, the no action alternative would have no effect on wilderness at Everglades National Park.	Implementation of the preferred alternative would result in minor, short-term, adverse effects on wilderness resources such as natural quiet, solitude, and the presence of wildlife from the noise and disruption generated by construction equipment and work crews. This option would also produce long-term adverse effects of negligible intensity caused by the visual intrusion of the raised infiltration beds and the continual low level of noise from the package plant blower and occasional sound of generator operation.
Park operations	Under the no action alternative, the maintenance intensity of the existing wastewater treatment system would continue to have a short- and long-term minor, adverse effect on park operations due to the continued monitoring, maintenance, and repair of the drainfield system and the periodic pump-out of the septic tanks.	The preferred alternative would result in some short-term, minor, adverse effects to park operations related to the training of staff on the new, more technically demanding system. However, long-term, minor to moderate, beneficial effects would be anticipated with the implementation of a high quality wastewater system.

AFFECTED ENVIRONMENT, EVALUATION METHODOLOGY, AND ENVIRONMENTAL CONSEQUENCES

Introduction

This section describes the environmental consequences associated with the alternatives. It is organized by impact topics, which distill the issues and concerns into distinct topics for discussion analysis. These topics focus on presentation of environmental consequences, and allow a standardized comparison between alternatives based on the most relevant topics. The National Environmental Policy Act requires consideration of context, intensity and duration of impacts, indirect impacts, cumulative impacts, and measures to mitigate for impacts. National Park Service policy also requires that "impairment" of resources be evaluated in all environmental documents.

Affected Environment

Detailed information on resources related to issues is identified prior to each impact topic analysis.

Park Description

Everglades National Park now encompasses 1,509,000 acres, comprising the southern tip of Florida (see Figure 1). The habitat has been described as a "river of grass" (Douglas 1947) that flows to the sea. The park contains an ecosystem that demonstrates the delicate balance within nature and the potential threats from human intervention. It is formed by a shallow river of freshwater 50 miles wide. The topography is so subdued that a broad sheet of water slowly flows over and through the porous limestone bedrock on its way to the sea, rather than following well-defined drainages. Most of the park is actually covered with water during normal wet seasons, while dry winters cause freshwater to dwindle to a few open areas that become crowded with wildlife. Twenty-one threatened and endangered animal species reside in the park, including the American crocodile *(Crocodylus acutus)*, Florida panther *(Felis concolor coryi)*, Eastern indigo snake *(Drymarchoncorais couperi)*, mangrove fox squirrel *(Sciurus niger avicennia)*, West Indian manatee *(Trichechus manatus)*, wood stork *(Mycteria americana)*, snail kite *(Rostrhamus sociabilis)*, and bald eagle *(Haliaeetus leucocephalus)*. The terrestrial and aquatic plant and animal communities have adapted to each other and to a climate of wet summers and dry winters. Although the park is often characterized as a sawgrass marsh, several distinct habitats exist within its boundaries, including: marine/estuarine; mangrove; coastal prairie; freshwater marl prairie; freshwater slough; cypress; hardwood hammock; and pineland. More than 350 bird species have been recorded, seven of which are rare or endangered.

Everglades National Park has the distinction of being a World Heritage Site and International Biosphere Reserve and is designated as a Ramsar Wetland of International Importance.

As a tourist destination drawing over one million visitors per year, the park is an important contributor to the economy of the local area. However, Everglades National Park is considered one of the most endangered national parks in the United States. A 93 percent drop in the population of wading birds nesting in the park, toxic levels of mercury found in all levels of the food chain, the die-off of seagrass in Florida Bay, and the number of endangered species are all indicators of the serious problems this park faces in the future. The declines are largely a result of problems with the quality, quantity, timing, and distribution of water throughout the Everglades.

Project Site Description

The Ernest F. Coe Visitor Center/headquarters/maintenance/housing area is just inside the eastern border of Everglades National Park. The Pine Island area (housing/maintenance area and entrance station) is located approximately one mile southwest of headquarters, adjacent to the main park road (see Figures 1 and 2). The area is flat, with ground elevations generally 4 to 6 feet above mean sea level. Shallow flooding occurs with heavy rains; however, the area is not subject to storm surge. The groundwater level fluctuates from a few feet below the ground surface to right at ground level (NPS 2001c).

The Pine Island developed area is located within the critically endangered Dade County slash pine habitat. It is an island of higher elevation surrounded by freshwater wetlands. Florida Bay is approximately 10 miles to the south. The proposed project area is located between the Corps of Engineers C-111 canal on the east and Taylor Slough, to the west, which drains a small watershed and empties into northeastern Florida Bay. The climate is hot and humid in the summer and mild in the winter. Rainfall averages 51 inches per year, with about 8 inches per month falling during the summer and 1 to 2 inches per month during the winter. Pan evaporation averages 64 inches a year.

The proposed project area is a highly disturbed narrow strip of land, immediately adjacent to critically endangered Dade County slash pine habitat. Facilities and roads have been placed on large quantities of fill. The site now supports artificially maintained vegetation (lawns). Adjacent to the developed area, pine rockland dominates with marl prairies in lower elevations. The area is also significantly impacted by the presence of invasive exotic vegetation.

The Ernest F. Coe Visitor Center is the main visitor center for the park and receives approximately 186,000 visitors annually, an average per year based on visitation from 1998 to 2002 (Scott pers. comm. 2002). The existing headquarters/Pine Island wastewater treatment system consists of 32 septic tanks and associated drainfields, comprising approximately 0.56 acres and is located within a native upland pine ecosystem. See Appendix E for photographs depicting the proposed project area.

Methodology

General Evaluation Methodology

Overall, the National Park Service based these impact analyses and conclusions on the review of existing literature and Everglades National Park studies, information provided by experts within Everglades National Park and other agencies, professional judgments and park staff insights, the Florida State Historic Preservation Office, interested local tribes, and public input. For each impact topic, the analysis includes a brief description of the affected environment and an evaluation of effects.

The impact analyses involved the following steps:

Identify the area that could be affected.

Compare the area of potential effect with the resources that are present.

Identify the intensity (negligible, minor, moderate, or major), context (local, parkwide, regional), duration (short- or long-term), and type (direct or indirect) of effect, both as a result of this action and from a cumulative effects perspective. Identify whether effects would be

beneficial or adverse. The criteria used to define the intensity of impacts associated with the analyses are presented in Table 4.

Impact analyses include implementation of mitigation measures taken to protect resources. Examples of these measures are outlined in Table 3.

General Definitions

The following definitions were used to evaluate the context, intensity, duration, and cumulative nature of impacts associated with project alternatives:

Context is the setting in which an impact is analyzed, such as local, parkwide, or region. CEQ requires that impact analyses include discussions of context.

Impact Intensity- Refer to Table 4 for complete descriptions of impact intensities used to assess effects for this analysis.

Duration

The duration of the impacts in this analysis is defined as follows:

short term - when impacts occur only during construction or last less than one year; or

long term - impacts that last longer than one year.

Direct versus Indirect Impacts

The following definitions of direct and indirect impacts were used in this evaluation:

direct - an effect that is caused by an action and occurs at the same time and place; or

indirect - an effect that is caused by an action but is later in time, or farther removed in distance, but still reasonably foreseeable.

Cultural Resource Analysis Method

Impacts to cultural resources are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ 1978) that implement the National Environmental Policy Act. The impact analyses also are used to comply with the requirements of Section 106 of the National Historic Preservation Act.

In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were identified and evaluated by:

determining the area of potential effects;

identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places;

applying the criteria of adverse effect to affected cultural resources either listed in or eligible for inclusion in the National Register; and

considering ways to avoid, minimize, or mitigate adverse effects.

The Advisory Council's regulations for Section 106 compliance require a determination of either *adverse effect* or *no adverse effect* for cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register. For example, this could include diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, *Assessment of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

The Council on Environmental Quality regulations (CEQ 1978) and *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001b) call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, such as reducing the intensity of an impact from major to moderate or minor. Any resulting reduction in intensity of impact because of mitigation, however, is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis for cultural resources. The summary is intended to meet the requirements of Section 106 and is an assessment of the effect of implementing the alternative on cultural resources, based on the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Cumulative Effects Analysis Method

The Council on Environmental Quality (CEQ 1978) regulations for implementing the National Environmental Policy Act require assessment of cumulative effects in the decision-making process for federal projects. Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative effects are considered for both the no action and proposed action alternatives.

Cumulative impacts are considered for all alternatives and are presented at the end of each impact topic discussion analysis.

Cumulative effects were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions at Everglades National Park and in the area surrounding Pine Island. Other actions that have the potential to have a cumulative effect in conjunction with this project include any development/actions by the National Park Service in the park, specifically:

Flamingo Potable Water System Improvements Project,

Flamingo Wastewater System Improvements Project,

Pine Island Water System Improvements,

Royal Palm Hole-in-the-Donut Substrate Disposal Plan, and

Parkwide Exotic Vegetation Management Plan.

Regional resource development/actions on both public and private lands in the vicinity, such as agriculture, urban development, and other activities that could adversely affect hydrology and surface water quality, including:

The C111 Canal Project, which is a component of major restoration efforts now underway with goals of improving hydroperiods and timing of water deliveries to Everglades National Park.

The Comprehensive Everglades Restoration Plan, with goals to restore, protect, and preserve the water resources of central and southern Florida.

Impairment Analysis Method

In addition to determining the environmental consequences of the preferred and other alternatives, the 2001 National Park Service Management Policies and Director's Order #12 (NPS 2001b) require analysis of potential effects to determine if actions would impair Everglades National Park resources.

The fundamental purpose of the National Park Service, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid or minimize to the greatest degree practicable adverse impacts on park resources and values. However, the laws do give National Park Service management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given National Park Service management discretion to allow certain impacts within parks, that discretion is limited by statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. However, an impact would more likely constitute an impairment to the extent it affects a resource or value whose conservation is:

necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;

key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or

identified as a goal in the park's Master Plan or General Management Plan or other relevant National Park Service planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities or from activities undertaken by concessioner, contractors, and others operating in the park. A

determination of impairment is made for each impact topic within each "Conclusion" section of this environmental assessment under "Environmental Consequences."

HYDROLOGY AND WATER QUALITY

Affected Environment

Water management is the critical issue for the Everglades. Development and upstream agriculture have dramatically changed the Everglades' water regime. Disruptions in the ebb and flow of water that supplies the “river of grass” have had significant impacts. The flows that once fed this unique system are now dramatically diminished by a network of canals, levees, and water control structures (Carter 2001). Much of the freshwater that once flowed here is now used in agriculture and urban areas. Experts now believe that the Everglades receive too little water during the dry season and too much during the rainy season. At times the water control structures at the park boundary are closed, restricting flows during historical flood season. Or alternatively, water control structures are opened and unnatural floodwaters occur during historically dry times (NPS 1997).

Regional Surface Waters

Historically, a portion of south Florida’s freshwater supply came from the Kissimmee River basin, north of Lake Okeechobee. During the rainy season, the lake would overflow its shallow southern shore. This flow traveled slowly as a shallow river, 50 miles wide and 100 miles long, through the Everglades and into the coastal estuaries of Florida Bay and the Gulf of Mexico (see Figure 7). The wetlands of the Everglades retain water, recharge aquifers, and form a mosaic of ponds, sloughs, sawgrass marshes, hardwood hammocks, tree islands, and pinelands (Working Group of the South Florida Ecosystem Restoration Task Force 1998).

The wet season begins with May thunderstorms. In the summer, natural areas are saturated with water. During the dry season (December to April), water levels gradually drop. The winter landscape is dotted with pools of water. Everglades’ plants and animals are adapted to alternating wet and dry seasons (NPS 1997).

Regional Groundwater

The aquifers that underlie south Florida are made mostly of limestone and other carbonate rocks. These formations tend to dissolve over time in water, making them porous. Groundwater travels relatively quickly through these formations. These open aquifers are said to be “unconfined” and are recharged by fresh surface water flows (USGS 2001).

The seasonality of water availability in the Everglades has created an interplay of surface water and groundwater. During the summer rainy season, increased overland flow and stream flows recharge aquifers near the surface. During the dry winter, these superficial aquifers supply groundwater to support stream flows and provide vital moisture for wetlands and marshes.

Regional Water Quality

The Everglades are affected by degraded water quality. Pollutants from urban areas and agricultural runoff, including phosphorus, nitrogen, metals, and pesticides, have negatively affected water quality, native vegetation, and animal populations. Agricultural nutrients entering the Everglades have caused a decline in native plant species and an overabundance of nuisance species (NPS 1997, Carter 2001).

Figure 7: Historic Freshwater Flows through the Everglades

Everglades Restoration Efforts

In response to public concern about development and continued ecosystem degradation, all levels of government have organized efforts to work towards a balanced and sustainable south Florida ecosystem. Several environmental and growth management laws have been passed in an attempt to address the needs of Everglades ecosystem restoration. Restoring and maintaining, at least in part, the natural hydrologic regimen of the area is the most vital component of all restoration efforts.

The South Florida Ecosystem Restoration Task Force was formalized by Congress in the Water Resources Development Act of 1996. Membership includes federal, state, local and tribal governments. The task force coordinates over 200 projects that are part of restoring the south Florida ecosystem. The task force uses three goals: 1) get the water right; 2) restore, preserve, and protect natural habitats and species; and 3) foster compatibility of built and natural systems. The Department of the Interior, which chairs the Task Force, uses the Comprehensive Everglades Restoration Plan as the principal mechanism for restoring natural hydrologic functions and for providing water supplies (Central and South Florida Comprehensive Plan, undated; NPS 1997).

The National Park Service actively pursues ecosystem restoration efforts, both within the park and at the regional level. National Park Service staff are involved in establishing restoration goals, evaluating projects, conducting scientific research, and monitoring field conditions to measure progress (NPS 1997).

Project Area

The Pine Island developed area is just east of Taylor Slough, the major naturally occurring eastern drainage of the park. Approximately 2 miles further east, outside the park boundary, is the Corps of Engineers C111 Canal. This constructed waterway conveys water from the north toward Florida Bay to the south. The natural flow of surface and groundwater in this area is believed to be from the

northwest to the southeast, or from Taylor Slough toward the C111 Canal. However, due to small differences in topography and geology, localized, site specific details of sheet flow and groundwater movement are unlikely to be known in the near future (Aumen pers. comm. 2002).

The Pine Island area is named for the dominance of pines on the landscape. The pine rockland community is found in areas of 4 to 6 feet in elevation. The soils in pinelands vary from mesic (wet) and poorly drained to xeric (dry) and well drained. These areas are generally underlain by hardpan or other impervious material at depths of one to several feet (Duever 2002). Depth to groundwater in the area varies with the season, and the soils may be saturated to the surface for several months each year (May to November) (Duever 2002). The pineland rocklands are surrounded by freshwater sloughs and coastal marl prairie (see "Vegetation").

The proposed project area has been disturbed and developed. Surface and groundwater flows in the area are inhibited by roads and buildings. Park facilities have been placed on fill. Vegetation near structures is a mix of native and non-native species.

Florida standards require that septic system drainfields be placed at least 24 inches above the water table (FAC 64E-4). [The "water table" is defined as the upper zone of saturation where the body of groundwater is not confined by an overlying impermeable zone (FAC 62-520)]. This regulation results from findings that nutrients and microbes from septic systems are not likely to travel more than 24 inches, unless saturated flow conditions exist (Speas pers. comm. 2003).

Given that the project area soils are saturated to the surface during wet months, the ground surface then correlates with the "water table." The Pine Island septic systems are not in compliance with current design standards. Complete guidance for installation and operation of a septic system and drainfield can be found in the Florida Administrative Code, Chapter 64 "Public Health" and can be accessed at http://fac.dos.state.fl.us/.

In addition, Florida law requires that "all groundwater at all places and all times" shall be free from constructed components or discharges that would be harmful or toxic to plants and animals, pose a threat to public health, create a nuisance, or impair the beneficial use of adjacent waters (FAC 1996). To protect the availability and utility of groundwater sources, the state has classified groundwater and assigned appropriate water quality criteria for each classification (FAC 62-520).

The groundwater at Pine Island is classified as "G-1: Potable water use in a single source aquifer which has total dissolved solids content of less than 3000 mg/L" (FAC 62-520). Therefore, the groundwater of the project area must be free of contaminants and able to meet the primary and secondary drinking water standards for public water systems established in the Florida Safe Drinking Water Act (FAC 62-520, Florida Dept. of Public Health; S. Speas, P.E. personal communication 2003). Selected water quality criteria applicable to this groundwater is shown in Table 7.

TABLE 7: WATER QUALITY CRITERIA FOR G-1 GROUNDWATER*

Contaminant	Concentration
Nitrogen (total)	10 mg/L
Phosphorus	No standard
Chloride	250 mg/L
Sulfate	250 mg/L
Microbiological contaminants (fecal coliform and E. coli)	No positive findings

*Florida Dept. of Environmental Protection Standards for Drinking Water (www.dep.state.fl.us/water/drinkingwater/standard.htm)

Impacts of Alternative A: No Action / Continue Current Management

Contamination of groundwater is the primary water resource concern associated with the existing septic systems and drainfields at Pine Island. The drainfields from the septic systems are located at depths of approximately 12 to 18 inches. The Florida requirement for 24 inches of distance from the drainfield to groundwater is not met. As a federal installation, the Pine Island systems are exempt from existing state regulations. However, the park is seeking to comply with current mandates.

The water quality of wastewater generated by Pine Island facilities has not been tested in any way. However, Crites and Tchobanglous (1998) have estimated the quality of wastewater generated by various types of facilities. Table 8 outlines the quantity of various components that could be discharged into the environment each day during peak wastewater flow periods. The total discharge of contaminants is presented in kilograms per day for all 32 septic systems. The majority of the components would be released at the highest volume site, park headquarters.

TABLE 8: TYPICAL COMPOSITION OF EFFLUENT FROM SEPTIC SYSTEMS AND RESULTING DISCHARGE OF WASTEWATER COMPONENTS*

Contaminant	mg/L*	Daily Load (liters per day, peak month)**	Kg/Day Discharged
Nitrogen (total)	68	58,024	3.9
Phosphorus (total)	16	58,024	0.9
Chloride	50	58,024	2.9
Sulfate	30	58,024	1.7
Microbiological contaminants (fecal coliform and E. coli)	1-1000 cysts/L	58,024	58,000 to 58,000,000 cysts per day

*Crites and Tchobanglous (1998)

** Pine Island water flow volume (see "Alternatives") converted to liters using 3.785 liters/gallon

By comparing the concentrations from Table 8 with the G-1 water quality criteria from Table 7, it can be seen that nitrogen in septic system effluent exceeds the groundwater quality standard (68 mg/L compared to 10 mg/L). Therefore, discharge of septic system effluent has the potential to degrade local groundwater.

Although septic systems in the Pine Island area are not in violation of state standards, the possibility of contamination creates the potential for negative impacts to the environment. In the event that the water wells become contaminated, the park would need to find alternative methods of supplying potable water to visitors and staff until the water treatment system were upgraded (see "Public Health and Safety" for more detail).

The presence of 32 small septic systems and mounded drainfields in the Pine Island area has produced negligible effects on local hydrology. The drainfields are small (approximately 900 square feet), and do not impede sheet flow or water movement over large areas. There is little evidence that the septic systems have affected the pine rocklands or wetlands in adjacent undeveloped areas (Armentano pers. comm. 2002).

Leaving the existing septic systems in place and continuing current management would produce long-term, negligible to minor, adverse effects on local hydrology and water quality. These adverse effects would result from the potential for wastewater components to contaminate local groundwater.

Cumulative effects. Changes in water quality and hydrology that have altered the Everglades have been caused by agriculture, large-scale water diversion projects, and urbanization. Effects on water resources at Pine Island have resulted from facility and infrastructure development, including filling for construction and road building.

The park is seeking to comply with larger scale regional Everglades rehabilitation efforts. Currently, water quality in Taylor Slough, the park's major eastern drainage, meets the discharge limits established in the Consent Decree (Aumen pers. comm. 2002). Because the Pine Island area may have a hydrologic connection to Taylor Slough, the National Park Service wants to assure that park activities do not detract from the high water quality now present in the slough. The no action alternative does not contribute beneficially to this mandate, and continues the possibility of long-term adverse effects to water quality at a negligible level.

Conclusion. Under this alternative, septic system effluent would continue to be discharged into local groundwater. Contaminant loading to local surface and groundwater would produce localized, negligible to minor, long-term, adverse effects. These would result from possibly exceeding state water quality criteria.

Changes in water quality and hydrology that have altered the Everglades have been caused by agriculture, large-scale water diversion projects, and urbanization. Effects on water resources at Pine Island have resulted from facility and infrastructure development, including filling for construction and road building.

The park is seeking to comply with larger scale regional Everglades rehabilitation efforts. Currently, water quality in Taylor Slough, the park's major eastern drainage, meets the discharge limits established in the Consent Decree (Aumen pers. comm. 2002). Because the Pine Island area may have a hydrologic connection to Taylor Slough, the National Park Service wants to assure that park activities do not detract from the high water quality now present in the slough. The no action alternative does not contribute beneficially to this mandate, and continues the possibility of long-term adverse effects to water quality at a negligible level.

Alternative A would not produce major adverse impacts on hydrology and water quality or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of hydrology and water quality or values as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

Under the preferred alternative, all 32 septic systems would be abandoned in accordance with state regulations. The planned wastewater treatment facility would reduce the nitrogen and phosphorus content of effluent to meet or exceed Florida Department of Environmental Protection (FDEP) requirements. The maximum allowable level of nutrients in the discharge would be 10 parts per million total nitrogen and 1 part per million total phosphorus, although the plant will be designed to meet 0.1 parts per million (or 100 parts per billion) total phosphorus.

The Florida Department of Environmental Protection requires that raised infiltration beds also be placed a minimum of 24 inches above the water table (FAC 62-520; Speas 2003). The raised infiltration beds constructed on the airstrip would be placed on existing fill material, with additional

fill added to ensure that the 24 inch requirement is met. This clearance is required to prevent contamination of local groundwater by nutrients and microbes found in wastewater.

Abandoning the existing septic systems would improve local groundwater quality. By meeting the standards and abandoning the failing septic systems, the preferred alternative would result in long-term, minor benefits to water quality and hydrology in the Pine Island area. This would reduce to negligible the potential effects on nearby Outstanding Florida Waters or possible water quality impacts to Taylor Slough to the west.

Compliance with groundwater quality criteria, and determination of potential impacts to adjacent wetlands would be determined through sampling from groundwater monitoring wells located in the vicinity of the raised infiltration beds.

Adverse effects to water quality could occur during construction activities. Excavation of the new raised infiltration beds could allow sediment to be delivered to nearby waterways. Construction activities would result in short-term, adverse effects to local water quality of minor intensity.

Cumulative effects. The disruptions to groundwater flow and surface hydrology that have altered the Everglades are caused by large-scale diversion projects. Regional water quality has been affected by upstream agriculture and urban development. Large-scale regional plans are now underway to address critical water quality and quantity issues.

The preferred alternative would contribute beneficially to Everglades restoration efforts by reducing nutrient delivery to the environment. This would effectively eliminate the potential for phosphorus from Pine Island to reach Taylor Slough. The preferred alternative would contribute beneficially to long-term regional restoration efforts, but because of the small scale of the project, the effect would be negligible.

Conclusion. Under the preferred alternative, the septic systems would be abandoned and wastewater would be centrally treated, collection/transmission lines would be constructed and effluent released into new raised infiltration beds (24 inches above the water table). This would reduce the local water quality impacts and result in long-term, minor, beneficial effects.

Increased erosion during construction activities could have adverse effects on local surface water quality. Appropriate mitigation measures would be used, and these effects would be short-term, minor, and highly localized.

The disruptions to groundwater flow and surface hydrology that have altered the Everglades are caused by large-scale diversion projects. Regional water quality has been affected by upstream agriculture and urban development. Large-scale regional plans are now underway to address critical water quality and quantity issues.

The preferred alternative would contribute beneficially to Everglades restoration efforts by reducing nutrient delivery to the environment. This would effectively eliminate the potential for phosphorus from Pine Island to reach Taylor Slough. The preferred alternative would contribute beneficially to long-term regional restoration efforts, but because of the small scale of the project, the effect would be negligible.

Alternative B would not produce major adverse impacts on hydrology and water quality or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for

enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of hydrological and water quality resources or values as a result of the implementation of Alternative B.

FLOODPLAINS AND WETLANDS

Affected Environment

Wetlands

The project area is contained within the previously disturbed and developed areas of Pine Island. The sites of wastewater collection and treatment are located on previously excavated and filled lands. None of the components of the collection and treatment system are located within the wetland habitats that are present immediately beyond the Pine Island developed area. The existing septic systems are adjacent to Park Service buildings and all are covered with maintained grass lawns.

The Recycle Building site (proposed location of the package treatment plant) and airstrip (proposed location of the raised infiltration beds) are also previously filled. The Recycle Building is served by an asphalt road.

The National Park Service has directed park staff to protect wetlands from adverse impacts wherever practicable (Director's Order 77-1). The National Park Service must avoid direct or indirect adverse impacts on wetlands, or where impacts cannot be avoided, degradation or loss must be minimized by every practicable effort. Any actions that may reduce or degrade wetlands are governed by the Clean Water Act and Rivers and Harbors Act (33 US Code Parts 1344 and 403, respectively) and are regulated by the U.S. Army Corps of Engineers and the Environmental Protection Agency.

Floodplains

The Pine Island area lies at an elevation of less than 10 feet above sea level. There is little change in topography across the project area. The existing septic systems and drainfields are located at approximately four to six feet in elevation. This area would likely be inundated by floodwater in the event of a hurricane or major tropical storm. Facilities located in these coastal high-hazard areas are required to meet Miami-Dade County floodplain management standards. Lands immediately adjacent to park headquarters and the Pine Island developed area are located in the A-zone and are subject to 100-year flooding.

Since the establishment of Everglades National Park in 1947, the park's mission has been to preserve resources inclusive of hydrological conditions within the park and the south Florida ecosystem. Subsequent agricultural and residential development surrounding the park has increased over the years and substantially changed the hydrology. South Florida's infrastructure of canals, levees and water control structures were built to control flooding and move water through agricultural and developed areas.

The Statement of Findings for Executive Order 11988 "Floodplain Management" is attached in Appendix C of this document.

Impacts of Alternative A: No Action / Continue Current Management

Wetlands

Under the no action alternative, effluent would continue to be delivered to local groundwater from the septic system drainfields. The nutrients contained in partially treated wastewater would have the potential to reach nearby wetland areas during times of high groundwater levels (approximately 9 months per year). The availability of nitrogen and phosphorus could serve as a fertilizer for wetland species, potentially causing a change in density of vegetation or species composition (Armentano pers. comm. 2002).

Vegetation transects and comprehensive water quality analyses have not been performed in the wetland areas adjacent to the existing septic systems. Although no detailed analysis has been made, inspection of the sites by qualified botanists suggests that nothing in the present pattern of vegetation indicates that septic field discharges have had an observable effect upon the pineland and marsh vegetation (Armentano pers. comm. 2002). The possibility of subtle effects that would be detectable only through detailed study cannot be dismissed. As explained in the "Hydrology and Water Quality" section, it is likely that nutrients are being delivered to nearby wetlands. However, the rate and distribution of delivery is not known. With only a portion of the information needed to thoroughly evaluate the potential effects to local wetlands, the effect can only be inferred from the scientific literature and professional judgment. Continuation of the no action alternative would likely result in long-term, adverse effects to wetlands of negligible to minor intensity.

Floodplains

The existing facilities at Pine Island are located in the 100-year floodplain out of necessity. There are no sites in this area that would not be subject to flooding during hurricanes or large tropical storm events. As explained in the "Hydrology and Water Quality" section, the systems are inundated when groundwater levels are high. The continued presence of multiple septic systems would result in long-term, negligible to minor, adverse effects on the local floodplain because inundation by high water could deliver nutrient and components of wastewater to local ground and surface water.

Cumulative effects. Under current management, the existing septic systems and drainfields would contribute to adverse effects on wetlands and floodplains in south Florida. Because regional impacts to wetlands have been due to large-scale water control projects and the presence of agriculture north of the park, the contribution of the existing septic systems and drainfields would be negligible.

Because the components of the existing systems are below ground, the contribution of the existing Pine Island septic systems to floodplain effects would be negligible.

Conclusion. Continuation of the no action alternative would likely result in long-term, localized, negligible to minor, adverse effects to adjacent wetland environments. Changes to the wetland could be due to the input of nitrogen and phosphorus contained in wastewater discharged from the existing septic systems.

The continued presence of multiple septic treatment systems and drainfields that are subject to flooding would result in long-term, negligible to minor, adverse effects on the local floodplain.

Under current management, the existing septic systems and drainfields would contribute to adverse effects on wetlands and floodplains in south Florida. Because regional impacts to wetlands have been

due to large-scale water control projects and the presence of agriculture north of the park, the contribution of the existing septic systems and drainfields would be negligible.

Because the components of the existing systems are below ground, the contribution of the existing Pine Island water treatment systems to floodplain effects would be negligible.

Alternative A would not produce major adverse impacts on wetland or floodplain resources whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of wetland or floodplain resources as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

Wetlands

Under the preferred alternative, the existing septic systems would be abandoned in accordance with state regulations. This would eliminate the dispersed nutrient loading to wetlands potentially occurring from 32 septic systems and drainfields. This would produce long-term, localized benefits to wetlands of negligible to minor intensity.

Replacement of the septic and drainfield system would also reduce the impact caused by effluent seeping into the groundwater and surrounding wetlands. Installation of two raised infiltration beds on the abandoned airstrip would concentrate treated wastewater in one location. The raised infiltration beds would be constructed at a minimum of 24 inches above high groundwater level to reduce nutrients entering the groundwater (see "Hydrology and Water Quality"). In addition, the new wastewater treatment facility would produce effluent lower in nitrogen and phosphorus. The standards to be met by the new facility include reducing total nitrogen to 10 parts per million and total phosphorus to 1 part per million, although the plant would be designed to reduce phosphorus to at least 0.1 parts per million total phosphorus.

In combination, cleaner effluent and properly constructed raised infiltration beds would produce long-term, localized beneficial effects of negligible to minor intensity.

Floodplains

The risk of flooding would be reduced by constructing a new wastewater treatment plant with critical components built above the base flood elevation. A modern treatment system and raised infiltration beds would replace the multiple septic tanks and drainfields, and consolidate wastewater treatment operations at one site. Although the action would potentially disturb some 7,500 linear feet within the 100-year floodplain due to construction of sewer mains, surface grades would be restored. No substantial increase in impermeable surface resulting in surface runoff would occur; therefore, there would be a negligible, short-term adverse impact to the floodplain.

Under the preferred alternative, newly constructed elements (package plant and raised infiltration beds) would be added to the Pine Island floodplain. The small footprint of the package plant and low impact construction of the lagoons would produce long-term adverse effects to the floodplain of

negligible intensity. Their presence in this developed area of roads, infrastructure, housing, and park facilities would contribute little to flood hazard in the area.

Cumulative effects. Under the preferred alternative the new wastewater treatment plant and raised infiltration beds would provide relative benefits for the wetlands and floodplains in south Florida. Because regional impacts to wetlands have been due to large-scale water control projects and the presence of agriculture north of the park, the contribution of the upgraded wastewater treatment system in reducing nitrogen and phosphorus in the effluent discharge would be negligible.

Urban development in south Florida has resulted in the presence of many facilities and communities within the 100-year floodplain. The upgraded wastewater treatment facilities would make no detectable contribution to regional effects.

Conclusion. Under the preferred alternative, the new wastewater treatment system would provide beneficial impacts to wetlands and floodplains of Pine Island. The reduced nutrient levels within the treated effluent discharged into properly constructed raised infiltration beds would result in long-term beneficial effects to wetlands of negligible to minor intensity.

The presence of the new package plant and raised infiltration beds in the Pine Island developed area would make a negligible adverse contribution of flood hazards in the Pine Island floodplain. The disturbance generated by construction activities would result in short-term, adverse effects of negligible intensity.

Under the preferred alternative the new wastewater treatment plant and raised infiltration beds would provide relative benefits for the wetlands and floodplains in south Florida. Because regional impacts to wetlands have been due to large-scale water control projects and the presence of agriculture north of the park, the contribution of the upgraded water treatment system in reducing nitrogen and phosphorus in the effluent discharge would be negligible.

Urban development in south Florida has resulted in the presence of many facilities and communities within the 100-year floodplain. The upgraded wastewater treatment facilities would make no detectable contribution to regional effects.

Alternative B would not produce major adverse impacts on wetland or floodplain resources whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's master plan or other National Park Service planning documents. Consequently, there would be no impairment of wetland or floodplain resources as a result of the implementation of alternative B.

SOILS

Affected Environment

A soil survey of the Pine Island area has not occurred since 1958. The latest Miami-Dade County soil survey (printed 1996) did not analyze soils within Everglades National Park; however, Pine Island is close enough to the border of the park to project the data fairly accurately. Three soil associations occur within the general region of Pine Island: Rock outcrop-Biscayne-Chekika association, Perrine-Biscayne-Pennsuco association, and Krome association. Soil series within these associations are described in Table 9.

TABLE 9: SOIL SERIES WITHIN THE PROPOSED PROJECT AREA

Series Name	Depth	Drainage	Permeability	Slope (percent)
Krome	very shallow	moderately well drained	moderately permeable	predominantly 0 to 2 percent, but range to 5
Chekika	very shallow	somewhat poorly drained	moderately permeable	0 to 2
Biscayne	shallow or very shallow	poorly and very poorly drained	moderately or moderately rapidly permeable	> 2
Perrine	n/a	poorly drained	moderately slowly to moderately permeable	> 1
Pennsuco	n/a	poorly and very poorly drained	moderately slowly to moderately permeable	> 1

Source: Soil Survey of Miami-Dade County Area, Florida originally printed 1996.

The series described in Table 9 were derived from scarification of the oolitic limestone present just below the surface throughout the area and from calcareous, silty sediments of the marine or freshwater environment.

The proposed project area resides predominantly on fill from local borrow pits and imported from other locations. The fill, along with the developed areas of the park, has been in place since the 1960s and is anywhere from a few inches to a few feet deep (Savage pers. comm. 2002).

Impacts of Alternative A: No Action / Continue Current Management

Routine and emergency maintenance activities of the systems would occasionally involve ground disturbance, possibly disrupting soil communities (fungi, bacteria, macro and micro invertebrates, and plants) and thereby altering the character and/or productivity of the soil from its natural state. Nutrient discharges would also impact soil communities by enhancing or retarding species growth and overall abundance. However, in the long-term, adverse impacts in both instances would be contained within the local area surrounding the septic tanks/drainfields and, considering the disturbed nature of the soils within the area, would be considered negligible.

Cumulative effects. Improvement projects within Everglades National Park, including planned water and wastewater system improvements near Flamingo (approximately 35 miles southwest of Pine Island) and potable water system improvements at Pine Island, would contribute or have already contributed to the diminished or disturbed nature of soils within the park's developed areas. This, however, is put into perspective when considering that only one tenth of one percent of the park has been developed (NPS 2000). Cumulatively these projects and the no action alternative would impact only minute portions of the park, and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

Conclusion. Impacts to soils resulting from the no action alternative would be long-term, negligible, adverse, and localized. These impacts would be due to the continued maintenance of, and limited nutrient discharges from, the aging septic systems.

Improvement projects within Everglades National Park, including planned water and wastewater system improvements near Flamingo (approximately 35 miles southwest of Pine Island) and potable water system improvements at Pine Island, would contribute or have already contributed to the diminished or disturbed nature of soils within the park's developed areas. This, however, is put into perspective when considering that only one tenth of one percent of the park has been developed (NPS 2000). Cumulatively these projects and the no action alternative would impact only minute portions of the park, and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

Alternative A would not produce major adverse effects on soils whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of soils as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

Under the preferred alternative, existing adverse impacts to soils discussed in the no action alternative would cease. This would constitute a long-term, negligible, beneficial, local impact to soils within the proposed project area.

This alternative would involve disturbing several acres of soil (approximate amounts shown in Table 10) within the proposed project area. Force main trenches would be dug to a maximum depth of three feet. In order to install collection/transmission lines from the various developed areas (including the park headquarters/main visitor center, park entrance station, park maintenance and park housing) to the new wastewater treatment plant, and from the plant to the raised infiltration beds, other trenches may need to be somewhat deeper (Savage pers. comm. 2002). The trenches would be dug within previously disturbed areas covered with fill and undisturbed areas where there is less than three feet of fill. This disturbance would take small areas of soil out of vegetative production temporarily, which would be considered a short-term, negligible, local, adverse impact.

TABLE 10: GROUND DISTURBANCE ASSOCIATED WITH THE PREFERRED ALTERNATIVE

Task	Ground Disturbance
Wastewater treatment plant	~500 square feet
Wastewater collection/transmission lines	¾ acre
Raised infiltration beds	3 acres

Cumulative effects. The improvement projects discussed in cumulative effects of the no action alternative would also occur for the preferred alternative. Cumulatively these projects and the preferred alternative would impact only minute portions of the park and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

Conclusion. The preferred alternative would result in long-term, negligible, local, beneficial effects to soils associated with the cessation of septic system maintenance activities and limited nutrient discharge. Short-term, adverse, local, negligible impacts to soils would also result from ground disturbance proposed in this alternative.

The improvement projects discussed in cumulative effects of the no action alternative would also occur for the preferred alternative. Cumulatively these projects and the preferred alternative would impact only minute portions of the park and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

Alternative B would not produce major adverse effects on soils whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of soils as a result of the implementation of Alternative B.

VEGETATION

Affected Environment

The proposed project area is a highly disturbed narrow strip of land, immediately adjacent to critically endangered Dade County slash pine habitat. The area was covered with fill prior to development, and contains artificially maintained vegetation. Mowed lawn covers much of the area including the areas surrounding park headquarters, the entrance station, and park housing.

The surrounding region is primarily pine rockland (pineland). These fire-maintained pine forests are dominated by south Florida slash pine (*Pinus elliottii* var. *densa*) with a mixture of tropical and temperate understory plants including cabbage palm (*Sabal palmetto*), saw palmetto (*Serenoa repens*), ferns, sedges and more than a hundred herbaceous species (Gunderson and Snyder 1994; Riach, undated).

Pinelands were once common along the Miami ridge (an upland area sitting atop limestone deposits), but are now the rarest of all south Florida communities, and are now considered a globally imperiled ecosystem type. They were the first areas in south Florida to be settled and developed and were intensively logged prior to the 1960s (Ricketts and Dinerstein et al. 1999). Due to this extensive disturbance, exotic plants have invaded the region which now supports thickets of Brazilian pepper (*Schinus terebinthifolius*) and lather leaf (*Colubrina asiatica*).

Within the pinelands are a series of transverse glades, marl prairies lower in elevation than the pinelands, which sometimes hold water in the wet season. In the past, some of these marl prairies held enough water to act as channels for transverse flow across the pinelands southward into marshes. However, because of the general lowering of the water table and the crossing of roads and canals, this flow is essentially non-existent today (Armentano pers. comm. 2002).

Marl prairie has an average hydroperiod of 3 and 7 months per year. Vegetation common within this wet prairie includes sawgrass (*Cladium jamaicense*), beak rushes (*Rhynchospora* sp.), spike rush (*Eleocharis* sp.), white top sedge (*Dichromena colorata*), and muhly grass (*Muhlenbergia capillaris*) (Riach undated).

Impacts of Alternative A: No Action / Continue Current Management

There are currently 32 separate septic systems (septic tanks and drainfields) being maintained and utilized within the proposed project area. With typical maintenance, the average life of a conventional septic system is in the range of 20 years (Loudon 2000). The systems in question were installed from the late 1950s until 1992 (making many of the systems on the order of 35 years old) and are in various stages of disrepair. Associated drainfields are inundated with water 9 months of the year.

Failing pipes, tanks, and drainfields, coupled with saturated soils, allow for limited nutrient discharge from these systems, although no indication of this discharge is readily apparent in the local vegetation (Armentano pers. comm. 2002) and no monitoring or flow modeling has been conducted.

Short-term impacts from discharge are, and would continue to be, adverse, negligible to minor and localized. These impacts would be largely offset by the prevalence of lawn grass monoculture throughout the majority of the proposed project area, and would include slight changes in local vegetation composition and growth rates. In the long-term, impacts from the no action alternative would likely worsen as existing septic systems continue to age and deteriorate. Meanwhile, routine and emergency maintenance and repairs require ground disturbance in the immediate vicinity of septic tanks/drainfields. Ground-breaking, excavation and backfilling operations displace and/or retard growth of disturbed vegetation, but again, taken in the context of developed areas like those in the proposed project area, impacts to native vegetation would be minor at worst.

Cumulative effects. Everglades National Park will be developing an Exotic Vegetation Management Plan in an effort to control non-native plant species to the benefit of the entire park including Pine Island. Under the no action alternative, as discussed above, septic systems would continue to discharge small quantities of nutrients into the immediate vicinity. Nutrient discharges would negligibly contribute to unnatural condition of the area thereby slightly increasing the likelihood of colonization by exotic species (this has already occurred to an extent throughout the area). The incremental effects of this alternative would not change the beneficial character of the management plan on the park.

Conclusion. Under the no action alternative, negligible to minor, adverse, short- and long-term, localized impacts to vegetation would result from the continued discharge of limited amounts of nutrients into the area surrounding the septic systems. Maintenance and repair of these systems would also continue and, as time passes, the frequency of repair would increase as the systems age.

Everglades National Park will be developing an Exotic Vegetation Management Plan in an effort to control non-native plant species to the benefit of the entire park including Pine Island. Under the no action alternative, as discussed above, septic systems would continue to discharge small quantities of nutrients into the immediate vicinity. Nutrient discharges would negligibly contribute to unnatural condition of the area thereby slightly increasing the likelihood of colonization by exotic species (this has already occurred to an extent throughout the area). The incremental effects of this alternative would not change the beneficial character of the management plan on the park.

Alternative A would not produce major adverse impacts on vegetation whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of vegetation as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

In the very short-term, impacts discussed under the no action alternative for nutrient discharge would continue as remnant wastewater is processed through the septic systems. In the long-term, as the systems are flushed, impacts from the existing systems would cease. The cessation of nutrient flow from the septic systems and a halting of system maintenance would represent a minor, localized, beneficial impact to vegetation associated with the diminished risk of plant community shifts in growth and composition.

The construction of the new wastewater treatment plant, installation of collection/transmission lines, and addition of two raised infiltration beds to the airstrip would impact vegetation during related ground-disturbance activities (see Table 10 for impacted area) and potential spillage of fuels. However, the impacts would be largely offset due to the previously disturbed state of the entire proposed project area, and the use of mitigation measures (outlined in Table 3). Adverse impacts resulting from these activities would be short-term (lasting only slightly longer than the activities themselves) and negligible. Effluent from the wastewater treatment plant would be piped to two raised infiltration beds located on the abandoned airstrip. The new raised infiltration beds would be elevated two feet above groundwater and are not likely to contribute nutrient loads to the surrounding area.

As part of ongoing operations of the new treatment system, vegetation within and around the raised infiltration beds would be mowed or controlled (Savage pers. comm. 2002). This action would also occur within a highly disturbed area and would not impact the surrounding native vegetation. Impacts due to the mowing of the raised infiltration beds would be long-term, negligible, adverse, and localized.

Cumulative effects. As discussed for the no action alternative, Everglades National Park will be developing an Exotic Vegetation Management Plan in an effort to control non-native plant species. This plan would benefit the entire park by reducing invasive vegetation and allowing the return of more native species and habitats. This would permanently remove the park's option to restore Dade County slash pine habitat at this site.

Ground disturbance associated with the preferred alternative would allow for recolonization of this area by exotics if left unmitigated. However, mitigation measures (described in Table 3) would be taken thereby reducing potential adverse impacts. The incremental effects of this alternative would not change the beneficial character of the Exotic Vegetation Management Plan on the park.

Conclusion. The preferred alternative would result in long-term, localized, minor, beneficial effects related to the cessation of nutrient discharge from, and maintenance of, existing septic systems.

This alternative would result in short- and long-term, negligible, adverse impacts to vegetation due to ground disturbances associated with the construction and installation of the new wastewater treatment plant and subsequent mowing of the raised infiltration beds. This alternative would also permanently limit the park's ability to restore critically endangered Dade County slash pine habitat on the project site.

As discussed for the no action alternative, Everglades National Park will be developing an Exotic Vegetation Management Plan in an effort to control non-native plant species. This plan would benefit the entire park by reducing invasive vegetation and allowing the return of more native species and habitats.

Ground disturbance associated with the preferred alternative would allow for recolonization of this area by exotics if left unmitigated. However, mitigation measures (described in Table 3) would be taken thereby reducing potential adverse impacts. The incremental effects of this alternative would not change the beneficial character of the Exotic Vegetation Management Plan on the park.

Alternative B would not produce major adverse effects on vegetation whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified

as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of vegetation as a result of the implementation of Alternative B.

WILDLIFE AND AQUATIC LIFE

Affected Environment

The warm wet climate, abundant vegetation, and unique habitats found within Everglades National Park support over 40 species of mammals, 347 species of birds, 50 species of reptiles (including 27 snakes and 16 turtles), and 15 species of amphibians. Only a portion of these species commonly occur in habitats present within the project area. These habitats consist mainly of pine rocklands (upland) and freshwater marl prairie (wetland). For a more detailed description of the vegetative habitats within the affected environment refer to the "Vegetation" section.

Special Use

There are on the order of 80 bird species known to breed within Everglades National Park. Several of these species occur and may nest within or near the proposed project area. These species include red-bellied woodpecker (*Melanerpes carolinus*), pine warbler (*Dendroica pinus*), chuck-wills-widow (*Caprimulgus carolinensis*), common nighthawk (*Chordeiles minor*), rufous-sided towhee (*Pipilo erythrophthalmus*), and northern mockingbird (*Mimus polyglottos*) (Snow pers. comm. 2003).

A list of other species observed within and surrounding the proposed project area is given in Table 11.

TABLE 11: WILDLIFE WITHIN THE AREA OF ANALYSIS

Common Name	Scientific Name
Mammals	
Bobcat	*Lynx rufus*
Florida panther	*Puma concolor coryi*
Opossum	*Didelphis marsupialis*
Rabbit	*Sylvilagus* sp.
Raccoon	*Procyon lotor*
White-tailed deer	*Odocoileus virginianus*
Birds	
Black-crowned night heron	*Nycticorax nycticorax*
Boat-tailed grackle	*Quiscalus major*
Carolina wren	*Thryomanes bewickii*
Cattle egret	*Bubulcus ibis*
Double-crested cormorant	*Phalacrocorax auritus*
Eastern screech-owl	*Otus asio*
Glossy ibis	*Plegadis falcinellus*
Great blue heron	*Ardea herodias*
Great egret	*Casmerodius albus*
Green heron	*Butorides virescens*
Kestrel (wintering only)	*Falco sparverius*
Little blue heron	*Egretta caerulea*
Red-shouldered hawk	*Buteo lineatus*
Snowy egret	*Egretta thula*
Tricolored heron	*Egretta tricolor*
Turkey vulture	*Cathartes aura*
White ibis	*Eudocimus albus*

TABLE 11: WILDLIFE WITHIN THE AREA OF ANALYSIS

White-crowned pigeon	*Columba leucocephala*
Wood stork	*Mycteria americana*
Reptiles	
American alligator	*Alligator mississippiensis*
Brown anole	*Anolis sagrei*
Brown water snake	*Nerodia taxispilota*
Corn snake	*Elaphe guttata*
Diamondback terrapin	*Malaclemys terrapin*
Dusky pigmy rattlesnake	*Sistrurus miliarius*
Eastern diamondback	*Crotalus adamanteus*
Eastern garter snake	*Thamnophis sirtalis*
Eastern indigo snake	*Drymarchon corais couperi*
Eastern mud snake	*Farancia abacura*
Florida cottonmouth	*Aghistrodon piscivorus*
Florida softshell	*Apalone ferox*
Florida water snake	*Nerodia fasciata*
Green anole	*Anolis carolinensis*
Ground skink	*Scincella lateralis*
Peninsula ribbon snake	*Thamnophis sauritus*
South Florida swamp snake	*Seminatrix pygaea*
Southeastern five-lined skink	*Eumeces inexpectatus*
Striped mud turtle	*Kinosternon baurii*
Amphibians	
Eastern narrow-mouth toad	*Gastrophyne carolinesis*
Everglades dwarf siren	*Psendobranchus striatus*
Florida cricket frog	*Acris gryllus*
Green treefrog	*Hyla cinerea*
Little grass frog	*Pseudacris ocularis*
Peninsula newt	*Notophthalmus viridescens*
Southern leopard frog	*Rana utricularia*
Squirrel treefrog	*Hyla squirella*
Fish	
Bluegill	*Lepomis macrochirus*
Florida gar	*Lepisosteus platyrhincus*
Largemouth bass	*Micropterus salmoides*
Mosquitofish	*Gambusia holbrooki*

Source: http://www.nps.gov/ever/eco/lists.htm and Snow 2003

Impacts of Alternative A: No Action / Continue Current Management

The continued use of multiple septic systems under the no action alternative would allow for the sustained discharge of limited amounts of nutrients into the immediate surroundings. Impacts to habitat were discussed in the "Vegetation" section of this document and found to be minor when looked at in the context of the proposed project area being previously disturbed. Impacts to wildlife due to nutrient discharge would be long-term, negligible and local. Wildlife within the proposed project area has habituated to current conditions and no perceptible change in species population, composition or character would arise from this alternative.

During routine and emergency maintenance of the septic systems, the physical presence of humans along with any associated tools or machinery would disturb wildlife in the vicinity of the activity inducing retreat from or avoidance of the area. These activities would last only as long as needed to

complete maintenance objectives, but would be ongoing and as such would be considered long-term. Impacts to wildlife would be negligible to minor and adverse.

Direct mortality to wildlife, particularly reptile and bird species, may result from accidental contact with automobiles traveling to and from the proposed project area. By obeying posted speed limits and remaining alert to the threat, residents and visitors to the area would avoid most incidents and minimize this long-term, adverse impact.

Cumulative effects. Improvement projects within Everglades National Park, including planned water and wastewater system improvements near Flamingo (approximately 35 miles southwest of Pine Island) and potable water system improvements at Pine Island, would contribute or have already contributed to the diminished or disturbed nature of the park's developed areas. This, however, is put into perspective when considering that only one tenth of one percent of the park has been developed (NPS 2000). Cumulatively these projects and the no action alternative would impact only minute portions of the park and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

The implementation of the Modified Water Deliveries Program, the C-111 Restoration Program, and the Comprehensive Everglades Restoration Program will benefit native wildlife populations as historic conditions return. The no action alternative would not benefit any of these programs, but should not have a detrimental impact on them either. Any incremental adverse impacts produced by this alternative, when looked at in the context of all south Florida ecosystems, would be negligible.

Conclusion. Long-term, negligible to minor, adverse, localized impacts to wildlife would result from the sustained discharge from, and continued maintenance of, existing septic systems.

Improvement projects within Everglades National Park, including planned water and wastewater system improvements near Flamingo (approximately 35 miles southwest of Pine Island) and potable water system improvements at Pine Islands, would contribute or have already contributed to the diminished or disturbed nature of the park's developed areas. This, however, is put into perspective when considering that only one tenth of one percent of the park has been developed (NPS 2000). Cumulatively these projects and the no action alternative would impact only minute portions of the park and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

The implementation of the Modified Water Deliveries Program, the C-111 Restoration Program, and the Comprehensive Everglades Restoration Program will benefit native wildlife populations as historic conditions return. The no action alternative would not benefit any of these programs, but should not have a detrimental impact on them either. Any incremental adverse impacts produced by this alternative, when looked at in the context of all south Florida ecosystems, would be negligible.

Alternative A would not produce major adverse effects on wildlife or wildlife habitat whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

The preferred alternative would result in disturbances associated with construction and installation of a wastewater treatment plant. Once the treatment plant became operational, noise would be produced from the blower and backup generator. The wastewater treatment plant's two raised infiltration beds, which would be located on the abandoned airstrip, would act as an attractive nuisance for some wildlife species, but would not pose a threat to these species.

Noise and the physical intrusion of machinery and personnel, though kept to a minimum, would adversely affect wildlife in the short-term (disturbances would last only as long as construction activities persisted). These impacts would be due to wildlife retreating from or avoiding the area while construction took place, and would be considered negligible to minor, short-term, and adverse.

In the long-term, negligible to minor impacts to wildlife would occur within the localized area surrounding the new wastewater treatment plant. As part of plant operations a blower would be employed, producing continuous noise. Wildlife in the area has acclimated to the sounds of a human development (automobiles, air conditioners, operations of the recycling plant, etc.) and the constant low level "hum" of the blower would not be out of the ordinary and would, most likely, not be perceived as a threat.

In addition to the continuous noise of the blower, a backup generator would run for approximately four hours every month as part of its routine maintenance. The starting and stopping of the diesel generator would produce noise, which would pose a perceived threat to wildlife in the vicinity resulting in a retreat from, or avoidance of the area while the noise persisted.

Neither the blower, nor the generator would induce physical impacts to wildlife. The perceived threat resulting from these noise sources would be a long-term, negligible to minor, adverse, localized impact considering the developed nature of the proposed project area.

The two raised infiltration beds that would be created on the abandoned airstrip under this alternative would provide a fairly large body of freshwater (each raised infiltration bed would be one acre in size and alternately used). The raised infiltration beds would be unfenced and open for use by wildlife. Reptiles, birds and mammals would utilize the raised infiltration beds as a source of freshwater to the same extent as the existing borrow pits are used. Wildlife utilization of the raised infiltration beds would occasionally bring them into contact with humans (a perceived threat) during maintenance operations, resulting in short-term, negligible to minor, adverse, localized impacts.

Impacts from automobiles discussed in the no action alternative would also occur under the preferred alternative. These impacts would be slightly elevated, in the short-term, due to construction traffic. With proper mitigation, including obeying posted speed limits and being aware of the threat, long-term, adverse impacts to wildlife resulting from accidental automobile collision would be negligible to minor.

This alternative would not damage or alter native pine rockland or marl prairie (wetland) habitat. There would be no impacts related to habitat disturbance (Snow pers. comm. 2003).

Cumulative effects. The improvement projects and programs discussed in cumulative effects of the no action alternative would also occur for the preferred alternative. Cumulatively, these projects and the preferred alternative would impact only minute portions of the park and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

Conclusion. The preferred alternative would result in negligible to minor, short-term, adverse effects to wildlife associated with the construction of the wastewater treatment plant and associated collection/transmission lines. Wildlife would retreat from or avoid the project site during construction activities and during subsequent use of the backup generator and maintenance of the raised infiltration beds.

The improvement projects and programs discussed in cumulative effects of the no action alternative would also occur for the preferred alternative. Cumulatively, these projects and the preferred alternative would impact only minute portions of the park and the incremental adverse impacts related to this alternative would be negligible, localized and short-term.

Alternative B would not produce major adverse effects on wildlife or wildlife habitat whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's master plan or other National Park Service planning documents. Consequently, there would be no impairment of wildlife or wildlife habitat resources or values as a result of the implementation of Alternative B.

ENDANGERED, THREATENED, OR PROTECTED SPECIES AND CRITICAL HABITATS

Affected Environment

Everglades National Park provides habitat for a variety of federally listed endangered and threatened species. In the four south Florida units of the National Park Service – Big Cypress National Preserve, Everglades National Park, Biscayne National Park, and Dry Tortugas National Park – 15 endangered and 7 threatened wildlife species are found (NPS 1997). In addition, one federally listed threatened plant, Garber's spurge, is also found in Everglades National Park. Of the listed species, it is possible that the project area may be visited or utilized by nine listed wildlife species (see Table 12).

Although the Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) occurs in marshes adjacent to the project area, the sparrow's aversion to forested areas and years of intensive surveys indicate that it is not likely to occur in the project area. Therefore, it is not included in the affected environment and is dismissed from further analysis.

The state of Florida has compiled the federal and state-listed species into a comprehensive listing. This information can be accessed at the Florida Fish and Wildlife Conservation Commission website at http://floridaconservation.org/pubs/endanger.html. Further information on all endangered species can be found at the U.S. Fish and Wildlife website at http://endangered.fws.gov/.

The Pine Island developed area contains infrastructure, park housing maintenance, and visitor facilities. This area is visited by over 186,000 visitors annually and is home to 70 park staff and their families. Use of this area by endangered and threatened species is limited by the intensity of human activity and the nature of the site as a disturbed and developed area. Actions that would be performed under either alternative would be confined to previously disturbed areas.

The **Eastern indigo snake** is a large, non-poisonous snake that may reach up to 8 feet in length. The eastern indigo snake gets its name from its shiny, blue-black color. Its diet consists mainly of other snakes, amphibians, small mammals, and occasionally birds and turtles. The species occurs throughout Florida and along the coastal plain of Georgia. Eastern indigo snakes prefer well-drained, sandy soils, and often use tortoise burrows for nesting. The range of these snakes varies by season and prey availability, and may cover from 12 to 266 acres (USFWS 1991).

TABLE 12: FEDERALLY LISTED ENDANGERED, THREATENED, AND CANDIDATE SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA

Common Name	Scientific Name	Status
REPTILES		
Eastern indigo snake	*Drymarchon corias couperi*	Threatened
BIRDS		
Wood stork	*Mycteria americana*	Endangered
Bald eagle	*Haliaeetus leucocephalus*	Threatened
MAMMALS		
Florida panther	*Felis concolor coryi*	Endangered
PLANTS		
Blodgett's silverbrush	*Argythamnia blodgettii*	Candidate
Deltoid spurge	*Chamaesyce deltoidea deltoidea*	Endangered
Florida pineland crabgrass	*Digitaria pauciflora*	Candidate
Garber's spurge	*Chamaesyce garbrei*	Threatened
Pineland sandmat	*Chamaesyce deltoidea pinetorum*	Candidate

The decline in Eastern indigo snake populations is attributed to loss of habitat to agriculture, and also to collecting for the pet trade. The docile nature of this animal has made it desirable as a pet (USFWS 1991). The species has also suffered from mortality during gassing of gopher tortoise burrows for rattlesnake collection. The species was listed in 1978, and has no designated critical habitat.

Little is known about the specific habits and niche of the Eastern indigo snake in Everglades National Park. Steiner et al. (1983) concluded that the Eastern indigo snake was secure within Everglades National Park where it is widely distributed and relatively common in pine and tropical hardwood forests, and to a lesser extent in coastal habitats and freshwater marshes. Although the snake within Everglades National Park occurs in abandoned farmland and developed sites, it has shown no preference for these disturbed sites. Specific mitigation measures for protection of the Eastern indigo snake are included in Appendix D.

Wood storks are large, long-legged wading birds, standing about 50 inches tall, with a wingspan over 60 inches. They have white plumage and a short, black tail. Their bill is black, thick at the base, and curved. These birds eat small fish, and probe with their bills for their food in shallow water no more than about 10 inches deep. They feed in freshwater marshes, tidal creeks, and brackish wetlands, and nest primarily in cypress or mangrove swamps (USFWS 1996).

Wood storks use thermal drafts for soaring, and may travel 80 miles from nest to feeding areas. These birds are highly social and nest in large rookeries and feed in flocks. They are long-lived and first breed at four years old. The current world population is estimated at 11,000 birds. Their U.S. range consists of parts of Florida, Georgia, and South Carolina. In south Florida nesting occurs as early as October, with young leaving the nest in February or March. It is estimated that two fledglings will need almost 400 pounds of fish during this time. The decline in wood stork populations is attributed mostly to loss of habitat by destruction of wetlands and control of flows that created the Everglades (USFWS 1996).

Wood storks are known to forage in the vicinity of the project area, and are occasionally observed loafing (resting) around the small freshwater raised infiltration beds that dot the Pine Island area. The closest nesting colony to the project area is approximately 17 miles from Pine Island at Paurotis Pond. In 2002, the number of wood storks nesting at Paurotis Pond, Cuthburt Lake, and Rodgers River Bay increased compared to the 2001 nesting season. All these colonies appeared to successfully fledge young (Gawlik 2002).

The **bald eagle**, with its white head and tail and dark body, is one of the most recognizable American birds. These large predators may reach 14 pounds, with a wingspan of 8 feet. Bald eagles feed largely on fish and occasionally on reptiles and amphibians, and tend to be found near the seacoast and along the banks of rivers and lakes. Their lifespan is over 30 years in the wild. They mate for life, returning to the same nest yearly, and laying two to three eggs. Bald eagles from northern parts of the range migrate south for the winter, gathering in roosting areas (National Wildlife Federation 2002).

The status of the bald eagle was changed from endangered to threatened in 1995. Recovering from the effects of DDT, ingestion of lead shot, and illegal hunting, the species has made a dramatic comeback (National Wildlife Federation 2002).

The Pine Island area includes habitat utilized by bald eagles, where the birds are occasionally observed. The nearest documented bald eagle nesting and overnight roosting sites are over 15 miles from Pine Island at Mahogany Hammock.

The **Florida panther** is a large, pale brown or buff cat with white underparts and tail tip. Mature males weigh between 100 and 150 pounds and can reach seven feet from nose to tip of tail. Females are considerably smaller – from 50 to 100 pounds and up to six feet in length. Florida panthers subsist on a mammalian prey consisting of white-tailed deer, wild hogs, and in some areas raccoon. Home ranges cover from 20 to over 450 square miles. Only preliminary data is available on Florida panther reproduction. Litter sizes range from one to four kittens, with a breeding cycle of two years (USFWS 1993).

In general, Florida panthers prefer large remote tracts with adequate prey, cover, and little disturbance. Habitat use is highly diverse and varies from upland hardwood hammocks, pinelands, and palm forests to wetland habitats of swamp and cypress. Cover is important, especially during hunting and denning. The Florida panther historic range extended from eastern Texas through the southeastern states. But today it is unlikely that viable populations of the Florida panther presently occur outside Florida. The only known self-sustaining population occurs in south Florida, generally within the Big Cypress Swamp region. Currently, the wild population is estimated to be 30 to 50 adult animals (USFWS 1993).

The recovery plan, prepared by the Florida Panther Recovery Team, seeks to achieve three viable, self-sustaining populations within the historic range of the Florida panther. This is to be accomplished through three principal sub-objectives: identify, protect, and enhance existing panthers and protect habitats; establish positive public opinion and support for panther management; and reintroduce Florida panthers into suitable habitat.

Florida panthers are occasionally sighted in the Pine Island area and tracks and scat are occasionally observed. There have been no reports of breeding pairs or denning activity in the area. Radio tracking and observation data suggest that panthers most likely pass through the area during hunting activities, and their presence would be considered transient (Snow pers. comm. 2003).

Federally Listed Plant Species

Although there are five federally listed plant species with the potential to occur in the project area, their occurrence has not been documented. Everglades staff have surveyed the sites of potential affect, and two state-listed species were encountered (Armentano pers. comm. 2002 – see below). Detailed descriptions of the federally listed plant species is not included in this document, but may be obtained by visiting the Florida Department of Agriculture website at http://www.virtualherbarium.org/EPAC/endangered.html.

State-listed Species

The state of Florida lists a variety of plant and animal species as endangered, threatened, species of special concern, or commercially exploited. The Florida Fish and Wildlife Conservation Commission's (FWC) list includes 117 animals; the Florida Department of Agriculture has identified 413 plant species for listing; and the federal listing for the state includes 54 plants and 104 animal species. The state-listed animal species with potential to occur within the project area are listed in Table 13.

TABLE 13: STATE-LISTED ANIMAL SPECIES THAT OCCUR IN THE PROJECT AREA

COMMON NAME	SCIENTIFIC NAME	STATE OF FLORIDA STATUS
White-crowned pigeon	*Columba leucophala*	Threatened
Tricolored heron	*Egretta tricolor*	Species of special concern
Snowy egret	*Egretta thula*	Species of special concern
Little blue heron	*Egretta caerula*	Species of special concern
White ibis	*Eudocimus albus*	Species of special concern

Source: Florida Fish and Wildlife Conservation Commission 2002

White-crowned pigeon (*Columba leucocephala*). In south Florida, the white-crowned pigeon is common in summer and uncommon in winter. The birds feed in hardwoods, such as fig, pigeon plum, poisonwood, and other fruit-bearing trees. Birds nesting on small keys in Florida Bay fly to the mainland or upper Keys (e.g., Key Largo) daily to feed. They are permanent residents in Florida, but their population numbers are highly seasonal. White-crowned pigeons begin returning to Florida in large numbers in April and the numbers increase until early June. Populations remain high through the summer with the seasonal peak occurring in September when many juvenile birds are flying. Most white-crowned pigeons leave Florida between mid-September and mid-October to fly to the Bahamas. More than half of the Florida population nests in Florida Bay, in Everglades National Park. Nesting on mainland Florida is rare. Nesting requires mangrove covered islands that are free of raccoons and human disturbance.

White-crowned pigeons require an abundant supply of fruit. The plants that produce this fruit are found in a number of habitats in southern Florida. White-crowned pigeons are occasionally observed at Pine Island near the fruit-bearing hardwoods adjacent to the Ernest F. Coe Visitor Center and headquarters buildings. Alternatives that disturb or remove fruit-bearing hardwoods the least are most favorable to white-crowned pigeons. Work conducted in the winter dry season months would be least disturbing to white-crowned pigeons.

Tricolored heron *(Egretta tricolor)*. Also called the Louisiana heron, this wading bird reaches 30 inches in height, and weighs up to one pound. Its slate-gray plumage is complemented by a white

belly and a white chin stripe. During most of the year, the bill is yellow with a black tip and legs are yellow. During mating season the bill turns bright blue and the legs are bright pink. The tricolored heron is found from Massachusetts to the Gulf Coast. Its diet consists primarily of fish, but may include small reptiles, amphibians, insects, and crustaceans. This species usually breeds in brackish and saltwater coastal areas, in mixed colonies with other herons. Nests are close to the ground, with a clutch size of 3 to 4 eggs. The maximum recorded age of a tricolored heron recorded in nature is 17 years (Ogden 1996a).

Tricolored herons are common near the raised infiltration beds and standing water in the Pine Island vicinity. These birds are observed feeding, but not nesting, in the Pine Island area. They appear to use Pine Island only during daylight hours.

Snowy egret *(Egretta thula).* The snowy egret is a small white heron, about 2 feet tall, with a 3 foot wingspan, and weighing just under 1 pound. This species is distinguished by a black bill and legs, with yellow feet. Both males and females have the same coloring. Snowy egrets breed in shared colonies in salt marshes, raised infiltration beds and shallow bays. A clutch generally has 3 or 4 pale green eggs. Prey includes aquatic organisms and insects, such as shrimp, fish, frogs, and insects. They forage by walking slowly or standing motionless and striking at the prey. The species was reduced from common to rare by 20th century plume-hunting. Their numbers have rebounded, with a peak population reached in the 1950s (Ogden 1996b).

Snowy egrets are very common throughout most of Pine Island, including freshwater ponds and most places with standing water. These birds are observed feeding, but not nesting, near Pine Island. They appear to use Pine Island only during daylight hours.

Little blue heron *(Egretta caerula*). The little blue heron is a wading bird found along the Atlantic coast from Massachusetts to Florida, and is most abundant along the Gulf of Mexico. This species ranges up to 30 inches in height. It can have a wingspread of 3 feet. Adults have a purple head and neck, with the body slate-gray. The long neck is held in an "S" curve at rest and in flight. Young are all white, with a blue bill and green legs. Little blue herons feed during the day on fish, reptiles, crustaceans, and insects. The long bill is used to jab and eat the prey, with a success rate of about 60 percent. They lay 3 to 5 eggs, and both sexes tend the nest and feed the young. Young birds leave the nest within 50 days (Rodgers 1996).

Little blue herons are occasionally seen in the Pine Island area, especially at ponds. They use the Pine Island area for feeding and day roosting only.

White ibis *(Eudocimus albus).* The white ibis is a medium-sized wading bird. Its feathers are entirely white, except for its dark wing tips. The face of the ibis is bare and pink, blending into a long, curved bill. It has long pink legs and webbed toes. Barriers, marshes, coastal islands and inland lakes are the preferred habitat and nesting sites. White ibis probe for aquatic crustaceans and insects using the curved bill. Pair formation depends on environmental conditions such as rain and food availability and does not occur at the same time each year. White ibis are highly sociable, nesting, feeding, roosting, and flying in flocks. Colonies begin as males gather. The females then come and build nests of woody plants nearby. Two to three eggs are laid. Both sexes incubate and tend the young. After about 40 to 50 days of parental care they leave the nest. They do not leave the colony until they are nearly two years old (Frederick 1996).

White ibis are found throughout the Pine Island area, including the mowed lawns. They use the area, including nearby ponds and standing water, for feeding and roosting. They have not been observed nesting within the Pine Island area.

State-listed Plants

The project area has been surveyed for the presence of state-listed plant species. Park staff report that two plants found on the Florida list of threatened species were found in the vicinity of the project area. *Melanthera parviflora* (small-leaf square stem) was commonly present at the site of the proposed treatment plant and raised infiltration beds.

Solanum donianum (Mullein nightshade) was also present, but uncommon at the site. Also known as the wild potato tree, this flowering shrub grows to five feet in height and has inconspicuous white flowers. The shrub bears small berries that resemble their tomato relatives. This plant is very attractive, may be cultivated as an ornamental plant, and can be toxic (LER's Rare Seed and Plant List 2002)

Impact Determinations to Federally Listed Threatened and Endangered Species

National Park Service scientific staff have made preliminary determinations as to what effect, if any, each of these alternatives would have on federally listed species. The National Park Service is in the process of informally consulting with the U.S. Fish and Wildlife Service, as detailed in Section 7 of the Endangered Species Act, to seek concurrence with the impact determinations.

Impacts of Alternative A: No Action / Continue Current Management

Eastern indigo snake. Under the no action alternative, routine maintenance and repair of the septic systems and drainfields would continue. Occasional small-scale excavation would be required, and open pits would be present for the time necessary to make repairs. Overnight covers would be placed over any open pits, but there is the possibility that individual indigo snakes could become trapped. It is unlikely that fatality would result from temporary trapping, but these individuals would be affected. This may affect, but is not likely to adversely affect, the Eastern indigo snake.

Wood stork. The foraging and loafing activities that occur in the vicinity of Pine Island would not be affected under the no action alternative. There would be no change in the availability of food or foraging sites. Because of the distance to the nesting colony, actions taken within Pine Island to maintain and repair the existing septic tanks and drainfields would not affect activities at the colony. Implementation of the no action alternative would have no effect on the wood stork.

Bald eagle. The bald eagle overnight roost sites and nest sites are approximately 15 miles west of the Pine Island developed area at Mahogany Hammock. Regular maintenance and repair activities would have no effect on eagle activities in the Pine Island area, and would have no effect on this species.

Florida panther. Panther use of the project area is largely transient, most likely during hunting. Under the no action alternative, routine maintenance and repairs of the existing septic systems and drainfields would be unlikely to affect any individuals of this species. In the event that an individual animal encountered maintenance and repair activities, they would likely avoid the immediate area. Continuing current management may affect, but is not likely to adversely affect, the Florida panther.

Federally listed Plants

Because no federally listed plants occur in the vicinity of the existing septic systems and drainfields, ongoing maintenance and repair of these systems would have no effect on federally listed plants.

State-listed Species

White-crowned pigeon. The no action alternative would have no effect on hardwood hammock vegetation, which provides roosting and foraging habitat for the pigeon. Therefore, the no action alternative is expected to have no effect on white-crowned pigeons.

Tricolored heron. The no action alternative includes no changes in the routine maintenance and repair of the existing septic tanks and drainfields. This alternative would not affect local activities of tricolored herons, and would therefore have no effect on this species.

Snowy egret. The no action alternative includes no changes in routine maintenance and repair of the existing septic tanks and drainfields. This alternative would not affect local activities of snowy egrets, and would therefore have no effect on this species.

Little blue heron. The no action alternative includes no changes in routine maintenance and repair of the existing septic tanks and drainfields. This alternative would not affect local activities of little blue herons, and would therefore have no effect on this species.

White ibis. The no action alternative includes no changes in routine maintenance and repair of the existing septic tanks and drainfields. This alternative would not affect local activities of white ibis, and would therefore have no effect on this species.

State-listed Plants

The state-listed plants that occur in the project area are found at the site of the proposed wastewater treatment plant and raised infiltration beds. No state-listed plant species were found on or near the existing drainfields. Therefore, the no action alternative would not affect state-listed plants.

Cumulative effects. The decline in populations of south Florida wildlife that has resulted in the designation of endangered and threatened species is due largely to habitat destruction. Large-scale water control projects installed to promote agriculture and development have resulted in disruption of the hydrologic cycle and destruction of native vegetation across the region. Within Everglades National Park, wildlife find refuge from development pressures and protection from hunting. The efforts of the park to protect species provides a benefit for their populations.

The limited and unscheduled amount of disturbance associated with management of the existing septic systems would not likely contribute detectably to regional cumulative effects on south Florida's threatened and endangered species.

Conclusion. The effects to endangered and threatened species under the no action alternative range from "no effect" to "may affect, not likely to adversely affect." The disturbance associated with routine maintenance and repair of the existing septic systems would be very small scale and of limited duration. Species that use these areas to forage could avoid the area during activities and return when repairs were complete.

The decline in populations of south Florida wildlife that has resulted in the designation of endangered and threatened species is due largely to habitat destruction. Large-scale water control projects installed to promote agriculture and development have resulted in disruption of the hydrologic cycle and destruction of native vegetation across the region. Within Everglades National Park, wildlife find

refuge from development pressures and protection from hunting. The efforts of the park to protect species provides a benefit for their populations.

The limited and unscheduled amount of disturbance associated with management of the existing septic systems would not likely contribute detectably to regional cumulative effects on south Florida's threatened and endangered species.

Alternative A would not produce major adverse impacts on endangered, threatened, or protected species or critical habitats or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of endangered, threatened, or protected species or critical habitats as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

Eastern indigo snake. During installation of the wastewater collection system and main, trenches typically 3 feet deep would be present for the time necessary to complete system installation. These actions would take place in the developed area of Pine Island, not in or near the preferred habitat of the Eastern indigo snake. However, appropriate protective measures would be taken (see Appendix D). Actions undertaken to install the new wastewater system at Pine Island may affect, but are not likely to adversely affect, the Eastern indigo snake.

Wood stork. Installation of the wastewater conveyance piping and wastewater treatment system would not interfere with foraging and loafing activities that occur in the Pine Island vicinity. Once the raised infiltration beds were put into use, they would likely support somewhat ephemeral populations of fish, amphibians, and reptiles which could occasionally serve as a food source (albeit unreliable) for the wood stork. Because the raised infiltration beds would be emptied and mowed routinely, it is not likely they would support reliable and persistent fish prey. The slight potential for increased food availability would result in a may affect, not likely to adversely affect finding for the wood stork under the preferred alternative.

Bald eagle. The bald eagle overnight roost sites and nest sites are approximately 15 miles west of the Pine Island developed area at Mahogany Hammock. Construction activities needed to install the new wastewater system would have no impact on overnight roost sites or nest sites. The presence of the raised infiltration beds may provide a slight increase in forage opportunities for eagles, and therefore this alternative may affect, but is not likely to adversely affect bald eagles.

Florida panther. Construction activities associated with installation of the new wastewater system would occur within the Pine Island developed area. This disturbance would be temporary, and all disturbed areas would be reclaimed. Individual panthers that may pass through the area during construction activities would likely avoid the disturbance. The design of the raised infiltration beds would permit access around the construction footprint after project completion, and human attendance would be periodic and almost entirely during the day. Implementation of the preferred alternative may affect, but would not likely adversely affect, the Florida panther.

Federally listed Plants

No federally listed plants occur in the proposed project area, and implementation of the preferred alternative would have no effect on federally listed plant species.

State-listed Species

White-crowned pigeon. The preferred alternative is not expected to impact hardwood hammock vegetation, which provides roosting and foraging habitat for the pigeon. Therefore, the preferred alternative is expected to have no effect on white-crowned pigeons.

Tricolored heron. Installation of the wastewater collection and treatment system would not affect existing foraging sites. The presence of the new raised infiltration beds may provide increased foraging opportunities in the Pine Island area, and this may affect, but is not likely to adversely affect local populations of tricolored herons.

Snowy egret. Installation of the wastewater collection and treatment system would not affect existing foraging sites. The presence of the new raised infiltration beds may provide increased foraging opportunities in the Pine Island area, and this may affect, but is not likely to adversely affect local populations of snowy egrets.

Little blue heron. Installation of the wastewater collection and treatment system would not affect existing foraging sites. The presence of the new raised infiltration beds may provide increased foraging opportunities in the Pine Island area, and this may affect, but is not likely to adversely affect local populations of little blue herons.

White ibis. Installation of the wastewater collection and treatment system would not affect existing foraging sites. The presence of the new raised infiltration beds may provide increased foraging opportunities in the Pine Island area, and this may affect, but is not likely to adversely affect local populations of white ibis.

State-listed Plants

Both *Melanthera parviflora* and *Solanum donianum* occur in the vicinity of the abandoned airstrip – the proposed location of the raised infiltration beds. Individuals of both species occur 5 to 10 meters from the airstrip in the adjacent wetlands. Construction activities could and should be confined to already disturbed locations to avoid intrusion into the wetlands and effects on these species. With proper avoidance measures, the preferred alternative may affect, but is not likely to adversely affect local populations of these two state-listed plant species.

Cumulative effects. South Florida's wildlife is threatened primarily from habitat destruction. Disruption of the hydrologic cycle and changes in vegetative communities are widespread in the region. Everglades National Park, in concert with other federal and state protected areas, provides protection for these species.

The limited disturbance necessary to install the new wastewater treatment system, in conjunction with other planned management activities at Pine Island, would not be likely to make a detectable contribution to effects on endangered and threatened species in south Florida.

Conclusion. The effects to endangered, threatened, and protected species under the preferred alternative range from “no effect” to “may affect, not likely to adversely affect."

Additionally, there would be no adverse effects to the designated critical habitats of any of these species. Raised infiltration bed management (vegetation and sludge removal) would not be likely to affect any listed species. The limited amount of construction disturbance, and the fact that excavation is restricted to previously disturbed and developed areas, also reduces the potential for effects to threatened and endangered species.

South Florida’s wildlife is threatened primarily from habitat destruction. Disruption of the hydrologic cycle and changes in vegetative communities are widespread in the region. Everglades National Park, in concert with other federal and state protected areas, provides protection for these species.

The limited disturbance necessary to install the new wastewater treatment system, in conjunction with other planned management activities at Pine Island, would not be likely to make a detectable contribution to effects on endangered and threatened species in south Florida.

Alternative B would not produce major adverse impacts on endangered, threatened, or protected species or critical habitats whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park’s Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of endangered, threatened, or protected species or critical habitats as a result of the implementation of Alternative B.

SOUNDSCAPE

Affected Environment

Sound environment (soundscape) includes existing and potential sources of natural sound, including interference (noise) to natural sounds in the park. Soundscape may include both mechanical and natural sounds that may vary in character from day to night, and from season to season. Natural soundscape is created by natural processes including, but not limited to, sound created by biological and physical components such as wind, flowing water, wave action, mammals, birds and insects. Natural ambient sound is the natural soundscape condition that exists in the park in the absence of any human-produced noise.

The definition of noise for this analysis is any undesirable sound that interferes with speech communication and hearing, or is otherwise annoying (unwanted sound). Under certain conditions, noise may have an adverse effect on human health by causing hearing loss. Noise may also have an effect by interfering with visitor activities or the quality of the visitor experience. Noise levels usually change continuously during the day, and exhibit daily, weekly, and yearly patterns.

Many Everglades National Park visitors come to enjoy the natural beauty and serenity of this tropical wetlands environment, including the soundscape. The frequencies, magnitudes, and durations of human-caused sound considered acceptable vary throughout the park, being generally greater in developed areas and generally lesser in undeveloped areas. The Pine Island developed area has an associated sound level that includes those expected with visitor center activities, including visitor center access/parking and visitors entering/exiting the visitor center. The park headquarters, adjacent to the visitor center, also contributes to sound levels that include staff parking and staff access to and

from the headquarters. The park housing/maintenance area and park entrance station, located approximately 1 mile from the visitor center/headquarters area, contributes to the sound level but is buffered by both distance and vegetation (pinelands and associated understory vegetation) from the visitor center use area. The Pine Island developed area is not located in proximity to any exceptional park resource features.

Impacts of Alternative A: No Action / Continue Current Management

If the no action alternative were to be implemented, the continued deterioration of the existing septic/ drainfield wastewater system and resulting repairs would have a short- and long-term, negligible adverse effect on soundscape. The periodic pump-out of 32 septic tanks (typically once every five years), and the occasional noise associated with the infrequent use of equipment and maintenance activity associated with the repair of drainfield lines would be negligible to both visitors and wildlife.

Cumulative effects. The noise levels that would be generated in addition to existing levels include the operation of a new water well/pump system adjacent (approximately 150 feet) to the Pine Island headquarters/main visitor center, and the additional traffic passing through this area associated with the construction and operation of the new Flamingo potable water and wastewater treatment system. The additional noise level would have a negligible to minor adverse cumulative effect on visitors, park staff, and wildlife because of the localized and minimal noise levels that would be generated by these projects.

Conclusion. The periodic pump-out of 32 septic tanks (once every five years), and the occasional noise associated with the infrequent use of equipment and maintenance activity associated with the repair of drainfield lines would have a short- and long-term, negligible adverse effect on soundscape.

The noise levels that would be generated in addition to existing levels include the operation of a new water well/pump system adjacent (approximately 150 feet) to the Pine Island headquarters/main visitor center, and the additional traffic passing through this area associated with the construction and operation of the new Flamingo potable water and wastewater treatment system. The additional noise level would have a negligible to minor adverse cumulative effect on visitors, park staff, and wildlife because of the localized and minimal noise levels that would be generated by these projects.

Alternative A would not produce major adverse impacts on soundscapes whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of soundscapes as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

The effects of the preferred alternative actions are evaluated against no action alternative that includes the continued use of the septic/drainfield wastewater treatment system; therefore the intensity of impacts of Alternative B are compared to a soundscape that includes all existing human activity in the project area, including the maintenance and repair of the existing septic drainfield wastewater treatment system.

Implementation of the preferred alternative would result in construction activities to install the new collection line system, the wastewater treatment plant, collection/transmission lines, and two new raised infiltration beds. Noise generated from this construction would have a short-term, negligible to

minor adverse effect on visitors because the majority of the construction activity, with the exception of the burying of a new collection line system, would occur in the park housing/maintenance area (a signed “no entry” area for visitors). However, in the short term, the activity associated with construction of the park housing collection lines, new wastewater treatment plant, and the passing traffic related to the construction of the two new raised infiltration beds would have a minor to moderate adverse effect on park staff living in the park housing area.

In the long-term, the reduced level of overall maintenance that would be associated with the new wastewater treatment system and the distance of the wastewater treatment plant/ raised infiltration beds from the visitor use area would have a negligible adverse effect on visitors and the visitor experience. Because the new wastewater plant is located adjacent to the park housing area, the blower which operates 24 hours a day/seven days a week (approximate 81 decibel level) and the generator that runs once a month for a 4-hour period (approximate 77 decibel level) would have a long-term, minor to moderate adverse effect on park staff living in the housing area (Lynn pers. comm. 2002). This noise level would most likely have a negligible adverse effect on wildlife in the area because of the small impact area and the ability of most wildlife species to avoid human activity.

Cumulative effects. While the noise level associated with the new wastewater treatment system would have a long-term, minor to moderate, adverse effect on park staff living in the housing area, the additional noise associated with the operation of the new water well/pump system adjacent (150 feet) to the Pine Island headquarters/main visitor center, and the additional traffic passing through this area associated with the construction and operation of the new Flamingo potable water and wastewater treatment system would have an overall negligible to minor adverse cumulative effect on park staff, visitors, and wildlife.

Conclusion. Noise generated from the construction of this new wastewater treatment plant would have a short-term, negligible to minor adverse effect on visitors because the majority of the construction activity would occur in the park housing/maintenance area, which is located 1 mile from the visitor use area. However, in the short- and long-term, the noise associated with the construction and operation of this new wastewater system would have a minor to moderate adverse effect on park staff living in the park housing area, due to the close proximity of the wastewater treatment plant and raised infiltration beds to the park staff housing area.

While the noise level associated with the new wastewater treatment system would have a long-term, minor to moderate, adverse effect on park staff living in the housing area, the additional noise associated with the operation of the new water well/pump system adjacent (150 feet) to the Pine Island headquarters/main visitor center, and the additional traffic passing through this area associated with the construction and operation of the new Flamingo potable water and wastewater treatment system would have an overall negligible to minor adverse cumulative effect on park staff, visitors, and wildlife.

Alternative B would not produce major adverse impacts on soundscapes whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park’s Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of soundscapes as a result of the implementation of Alternative B.

CULTURAL RESOURCES

Historical Overview

Prehistoric Period. Although archeological evidence suggests that the earliest human presence in south Florida can be traced to the Paleo-Indian period (12,000 to 7500 B.C.), sites from this period have not been discovered in Everglades National Park (NPS 2002b). Paleo-Indian people depended largely on large game ("megafauna") such as mammoth and bison. The end of the period was marked by dramatic climate change from arid to wet conditions. This change was accompanied by the extinction of many large mammals, and the Paleo-Indians adapted by changing their subsistence strategies (NPS 1998).

The next cultural stage – the Archaic period – lasted from 7500 to 500 B.C. The Archaic period is divided into three broad temporal divisions based mainly on stylistic changes in projectile points and the introduction of fiber-tempered pottery in the Late Archaic period. These periods are the Early Archaic (7500 to 5000 B.C.), the Middle Archaic (5000 to 3000 B.C.) and the Late Archaic (3000 to 500 B.C.). Pottery first appears in the Late Archaic around 2000 B.C. (NPS 2002b). The Archaic period in general may be characterized by a shift to increased sedentism and dependence on hunting, fishing and gathering. No evidence of Early or Middle Archaic period has been discovered within Everglades National Park. Some shell work sites within the park suggest the possibility of a pre-Glades or Archaic period occupation, dating to 1000 B.C. (NPS 2002b).

The Glades tradition (500 B.C. to A.D. 1700) followed the Archaic period, and is divided into three sub-periods, identified by pottery types. In Glades I (500 B.C to A.D. 500) pottery was plain, with the Glades I late period (A.D. 500-750) defined by the appearance of incised and punctuated types of decorated pottery. Glades II spanned the period from A.D. 750-1200, with incised pottery continuing through Glades IIa and Glades IIb but being abandoned, along with other types of decoration, in the Glades IIc period (A.D. 1100-1200). During the Glades III period, incised ceramics (with different motifs from Glades IIb) are found in Glades IIIa (A.D. 1200-1400) but not Glades IIIb (A.D. 1400-1513). Glades IIIc (A.D. 1513-1700) sees a continuation of the Glades IIIb ceramics but also the appearance of European artifacts (NPS 2002b). Over half the known archeological sites in Everglades National Park are dated from the Glades II period from A.D. 750-1200. Most of these are large shell or earth midden sites (NPS 1998; NPS 2002b).

Historic Period. At the time of Ponce de Leon's arrival in A.D. 1513, there was a thriving population in south Florida, with at least four separate tribes numbering *c*. 20,000 people: the Calusa in southwest Florida and the Tequesta, Jega and Ais along the east coast (NPS 2002b). The Calusa and the Tequesta inhabited the area that is now Everglades National Park, with the Calusa chiefdom having political dominance over the other tribes (NPS 1998).

Ponce de Leon's first contact with the Indians was most likely with the Ais (Griffin 1988). He later visited the Tequesta at Biscayne Bay and then with the Calusa at Charlotte Harbor (NPS 2002b). Other Spanish expeditions explored areas of south Florida but most of these made landfall north of the Everglades and few early maps show the Everglades area of the Florida peninsula in detail (Paige 1986).

Aboriginal populations declined dramatically after the arrival of Europeans. When the English gained control of Florida in A.D. 1793, only a few hundred members of these tribes remained. The last of the Calusa either united with the Seminole population or migrated to Cuba with the Spanish (Swanton 1979).

As pressure from European immigration increased, tribes from the northern states began to settle in Florida. Throughout the 18th and 19th centuries, the Creek immigrants who had settled in north Florida were continuously driven out from their settlements by European and American expansion (NPS 2002b). The Seminoles, as they were referred to after the 18th century, moved farther south into remote areas of Florida. During the Seminole Wars of the early 19th century, bands of Seminole Indians resisted relocation to the reservations of Oklahoma and retreated into the far reaches of what is today Everglades National Park and Big Cypress National Preserve (NPS 2001d). The contemporary Seminole and Miccosukees are descended from fewer than 200 survivors left at the end of the last Seminole War in 1858 (Weisman 1999). The historical Seminole in Florida are divided into two separate nations, the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida, federally recognized in 1957 and 1962, respectively (Weisman 1999).

The Everglades have also been home to many non-Native American people and occupation occurred in seasonal fishing camps, seasonal fishing villages and permanent habitation sites. Various commercial activities have been undertaken by Euro-Americans in the Everglades. In the 18th century, Spanish and English fishermen were exploiting the abundant natural resources, including fish, shellfish and turtles (NPS 2002b). This use was continued in the 1880s by Key West fishermen who were supplying fish for consumption in south Florida and Cuba. In the early 20th century, fish house operations opened in the Everglades, where fish were caught, salted, dried and then exported to Cuba. By 1936 there were more than 100 fish houses in the Everglades (Paige 1986). A number of small ice plants also opened up to supply ice to the fish houses. Sponging, turtling, shellfishing, hunting, trading, agriculture, ranching, tannic acid production, charcoal manufacturing and railroad building were other commercial activities that occurred in the Everglades (NPS 2002b).

Euro-American settlement in the Pine Island area began as a spin-off of early development at nearby Royal Palm Hammock (also known as Paradise Key). Although expeditions and surveys noted the existence of this hammock in the nineteenth century, its exact location was unknown. Attention was first focused on Paradise Key in 1893 when Dr. H.P. Rolf, dean of the University of Florida College of Agriculture, and Dr. N.L. Britton, director of the New York Botanical Garden, explored the Everglades to examine the stand of royal palms on the key. Reports of their trip spread among colleagues and the movement to preserve the area as a park arose (NPS 2000b). By 1901, Florida Governor William Sherman Jennings was receiving reports requesting that the hammock be preserved, but since its precise location was unknown, no action was taken (NPS 2000b). The exact location of Paradise Key was not known until William J. Krome's expedition of 1902-1903. By 1904 the Florida East Coast Railroad had reached Homestead and in 1905 construction on the railroad south of Homestead had begun. The result was that nearby Paradise Key was no longer a remote destination visited only by a handful of hunters and scientists.

Early Protection Efforts. Also in 1905, the Florida Federation of Women's Clubs endorsed a proposal to make Paradise Key a federal forest reservation in order to preserve its unique group of royal palms. Their request, however, was ignored by the state legislature at that time (NPS 2000). In 1912, the Florida East Coast Railway acquired ownership of most of Paradise Key. The company's real estate manager, the Model Land Company, planned to drain and open the area to settlement (NPS 1998). In 1915, construction began on a road to link Florida City to Cape Sable, by way of Paradise Key. The difficult terrain and remote location impeded progress and the road did not reach Flamingo until 1922. The Homestead Canal was dug alongside the road to allow drainage and supply fill for the roadway (NPS 1998).

While industrialists tried to drain and develop the Everglades, naturalists worked to protect its unique flora and fauna. Creation of Royal Palm State Park was backed by influential individuals and groups.

The Florida Federation of Women's Clubs, Governor William S. Jennings, and several influential naturalists, played roles in establishing the park. The state park was dedicated in 1916, before a crowd of 750 who traveled in 150 cars over the newly constructed section road. Over 4,000 acres were contributed to the state park by the Florida East Coast Railway Company and the state of Florida. At the dedication ceremony for Royal Palm State Park, the road to Flamingo was named the Ingraham Highway, in honor of James Ingraham, vice president of the railway and a strong supporter of establishing Royal Palm State Park, the first state park in Florida (NPS 2000b).

To make the state park self-supporting, contributions were sought, and the land currently known as the Hole-in-the-Donut restoration area was rented to tomato farmers. A lodge was constructed in 1917 to house visitors (NPS 2000). None of these efforts, even combined with a small appropriation from the state, were sufficient and the park did not attract the needed revenues to continue operations. After a hurricane in 1926 and several fires in 1927, the park needed considerable funds for restoration (NPS 2000b).

Efforts to create a national park in the Florida Everglades began as early as the 1920s. In December 1928, the Tropical Everglades National Park Association was formally organized. In 1929 the Florida legislature approved formation of a Tropical Everglades National Park Commission, which had the power to acquire land by purchase, gift, bequest or condemnation for the proposed park (NPS 2000b). The Federation of Florida Women's Clubs offered the lands of the state park for inclusion in 1929 (NPS 1998). In May 1934, the House of Representatives finally passed an amended Everglades National Park bill, which the Senate approved a few days later. However, Congress included language in the bill which prevented appropriation of funds to purchase land for five years. Everglades National Park was finally dedicated in Everglades City on December 6, 1947.

Development of National Park Service facilities in the Pine Island area occurred in the decades that followed establishment of the national park. Facilities constructed in 1949 included the Pine Island storage building and two employee housing units. The Pine Island ranger station was constructed in 1950 and followed in 1951 by two additional employee housing units. The maintenance office was constructed in 1953. The Florida National Parks & Monuments Association building, supply building, carpenter shop, equipment storage bays, nursery and 5 additional housing units were constructed in Pine Island between 1955 and 1959. The visitor center is believed to have been constructed in the late 1950s or early 1960s. A metal chickee was added to Pine Island in 1969. No other significant structures were added to the Pine Island maintenance and housing complex until 1992. At that time, Hurricane Andrew destroyed the visitor center and damaged other structures in the Pine Island area. Repairs to Pine Island facilities and the addition of aboveground fuel storage tanks, storage sheds and a mobile home occurred following Hurricane Andrew. The main park visitor center reconstruction was completed in 1996 and named in honor of Ernest F. Coe, a key leader in efforts to establish the national park. The recycling building at Pine Island was added in 1993, a hazardous materials storage building was added in 1997 and the laundry and restroom building was constructed in 1999. Most recently, a pump house structure was added in 2002.

Previous Investigations

The earliest archaeological investigations in what is now Everglades National Park occurred between 1900 and 1922 but that work was concentrated along Florida's southwest coast (NPS 2002b). John Goggin began his survey of south Florida in the late 1930s. Goggin's work was not aimed at a comprehensive inventory of just the park area and he did not conduct fieldwork in the area of potential affect for this project. In 1964, John Griffin undertook a survey of 21 sites within the park but, again, these sites are not with the current project area. In 1965, a project was begun by William

Kennedy and William Sears to locate sites on an overall base map of the park. It was at this time that the importance of aerial imagery in conjunction with aerial overflights was realized (NPS 2002b). This short-lived project was followed by archaeological surveys of the park, conducted by the National Park Service's Southeast Archaeological Center (SEAC) between 1982 and 1984. These archaeological surveys were conducted using aerial photographs to locate areas of high potential which were then verified through archaeological survey and testing. The Pine Island area has never been archaeologically tested.

No known archaeological resources were identified during the major construction activities in the Pine Island area in the 1940s and 1950s but documentation from that time period is poor and archaeological investigations were not legally required at that time. The topography of the Everglades is such that human activity (prehistoric, historic and modern) is somewhat limited to the raised dry areas like Pine Island, which displays all of the features that would have made it, and continue to make it, an attractive location for human activities (NPS 2003). Significant archaeological resources are known to exist near (but not within) the project area. A review of previous archaeological work in the park and the park's Archaeological Sites Management Information System (ASMIS) database indicates that there are no previously recorded archaeological sites in the Area of Potential Affect.

No survey for historic archaeological resources has been conducted, although subsurface features of the Ingraham Highway are present within the project area. The removal of a 0.6-mile portion of the Ingraham Highway across Taylor Slough in 1993 revealed elements of original road construction fabric. During that removal, a crane operator unearthed three separate areas of vertically and horizontally positioned wood pilings and square posts. Each piling was approximately 18" across and 8 to10' long while the square posts were 6" X 6" X 8'. The posts were discovered at an average depth of 2 to3 feet in naturally low lying areas. A total of 15-20 pilings and posts were unearthed. The 1993 work provides some idea of the type of cultural material that may be extant in the areas of removed Ingraham Highway within the project area.

Ethnographic resource and cultural landscape inventories have not been prepared for Everglades National Park. Although funding for these projects has been requested through the National Park Service, it has not been received and formal evaluations of these resources have yet to occur.

Affected Environment

Archaeological Resources. There are no previously recorded archaeological sites within the Area of Potential Affect. Although much of the project construction activity would occur within previously disturbed areas, work would occur in undisturbed areas as well. Determinations of potential impacts has to consider depth of fill, not just horizontally (or spatially) disturbed areas. Although the area has been filled in the past, records regarding location and depth of fill are not available. As a result, excavation for the project is expected to exceed the depth of fill in some areas, cutting into previously undisturbed areas.

Historic Structures. This project includes proposed actions along a portion of the Ingraham Highway, the first road to penetrate the Everglades. The Ingraham Highway is on the park's List of Classified Structures and has been determined eligible for the National Register of Historic Places. A National Register nomination for the 41-mile length of the Old Ingraham is currently being prepared by National Park Service staff at the Southeast Regional Office. The historic road was 37 feet wide in most places (NPS 2000b). Portions of the highway have been incorporated into the modern park road system and the utility line trench for this project would be dug approximately 1 foot east from the eastern edge of the existing road. Although altered (graded, widened and repaved), the road maintains

enough integrity for the National Register nomination. The administrative road from the main park road to Pine Island intersects the route of the Ingraham Highway near the borrow pit (see Appendix G) and follows it for 1/2-mile to where it turns west at the Pine Island developed area. A portion of the original Ingraham Highway (east of the borrow pit) was removed by the National Park Service in the 1960s. This project will cut a 4-foot wide by 3-foot deep trench through the removed portion of the Ingraham Highway, where it meets the current park road by the borrow pit. Information regarding the removal procedures has not been found and there may be extant sub-surface features of the Ingraham Highway in this area of the project. If present, these features are likely to be posts and pilings similar to those uncovered during removal of the road across the Ingraham Highway in 1993.

With the exception of the Ingraham Highway, no other structures in the Area of Potential Affect are on the park's List of Classified Structures. Although some of the park buildings at Pine Island are more than 50 years old, none are on or have been determined eligible for the National Register of Historic Places (Culhane pers. comm. 2003). There are no buildings within or adjacent to the project area identified as historically significant resources.

Cultural Landscapes. The park has not conducted a cultural landscape inventory. Although there are believed to be several potentially significant cultural landscapes within Everglades National Park, they are not located in the Pine Island maintenance/housing and park headquarters complexes. Any potential cultural landscape associated with the Ingraham Highway would not have historical integrity within the project area given that it is within the development zone of the park. This area includes a visitor center, park maintenance and administrative facilities and park housing. All buildings were erected subsequent to park establishment in 1947. The landscape has been altered during related construction activities and fill was placed over several decades and varies in composition and depth. The buildings vary in age, materials and design, and lack architectural continuity.

Ethnographic Resources. The park has not conducted an ethnographic resources inventory. However, this project is within the development zone of the park and no ethnographic resources are believed to be present.

Museum Collections. The Everglades National Park museum collections contain the artifacts and associated field records from all fieldwork projects undertaken on park lands. The administrative history collections in the museum archives include maintenance and development records. Museum collections are not stored within the Pine Island project area.

Impacts of Alternative A: No Action / Continue Current Management

Implementation of Alternative A would require additional repair and maintenance of the existing septic systems and drainfields. This work would occur in the previously disturbed areas associated with the existing systems and utility lines. There are no previously recorded archaeological sites within the project area. The opportunity to locate new archaeological sites is eliminated with the no action alternative and there would be no impacts to archaeological resources.

The section of the Ingraham Highway that has been incorporated into the park road system and that section removed by the park in the 1960s would not be impacted as a result of the implementation of the no action alternative.

Although the park has not conducted a cultural landscape inventory, implementation of the no action alternative would have no impacts on potential cultural landscapes.

Although the park has not conducted an ethnographic resources inventory, implementation of the no action alternative would have no impacts on potential ethnographic resources.

Implementation of the no action alternative would have no impact on existing museum collections. The discovery of new artifacts for the museum collection would be eliminated. Project documentation to be incorporated into the museum collection would provide a negligible benefit.

Cumulative effects. Because maintenance of existing systems does not require disturbance in previously undisturbed areas, implementation of the no action alternative would not contribute either beneficially or adversely to cumulative impacts on cultural resources at Pine Island or in Everglades National Park as a whole. Effects to park-wide or regional cultural resources caused by development, vandalism, theft, or looting would not be changed under this alternative.

Conclusion. Because no new soil disturbance, excavation, or construction is proposed in previously undisturbed areas, continuation of existing conditions would be unlikely to have any impact on archaeological sites, historic structures, cultural landscapes, ethnographic resources or museum collections.

Alternative A would not produce adverse effects on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of cultural resources or values as a result of the implementation of Alternative A.

Impacts of Alternative B: The Preferred Alternative

Under this alternative, the park proposes installation of a new centralized wastewater treatment facility and new wastewater collection/transmission system throughout the Pine Island developed area. Treated effluent would be discharged into two new raised infiltration beds, located on the abandoned airstrip. The new facility would use best available technology to meet current and future demand and comply with requirements of present and future state standards.

The level of development and previous disturbance makes adverse effects on archaeological resources unlikely. Under the preferred alternative, the project area would be surveyed for archaeological resources prior to construction. Work would be monitored and contracts would include work-stoppage provisions if resources were discovered. The package plant would be placed on existing hardtop and no new excavation would be needed for its installation. The transmission lines would be located in trenches that were approximately 4 feet wide and 3 feet deep, located approximately 1 foot east of the eastern edge of the existing road. The raised infiltration beds would be placed on the existing airstrip. The infiltration beds would be limestone placed on top of existing grade. This would require removal of up to 4 inches of disturbed surface material in preparation for the new fill. There would be an approximately 2 foot deep trench for transmission pipes excavated to each of the infiltration beds. Project construction and trenching would occur in areas that are spatially (horizontally) previously disturbed. However, the depth of excavations for transmission lines may impact previously undisturbed deposits in areas with less than 3 feet of fill. As a result, implementation of the preferred alternative could produce negligible adverse effects on the archaeological resources.

The Ingraham Highway is on the park's List of Classified Structures and is eligible for the National Register of Historic Places. A National Register nomination for the 41-mile length of the Old Ingraham is currently being prepared by National Park Service staff at the Southeast Regional Office. Although altered (graded, widened and repaved), the road maintains enough integrity for the National Register nomination. The historic road was 37 feet wide in most places (NPS 2000b). Portions of the highway have been incorporated into the modern park road system and the utility line trench for this project would be dug approximately 1 foot east from the eastern edge of the existing road; therefore, it is not anticipated that the project would disturb those portions of the Ingraham Highway currently incorporated into the park's road system. The administrative road from the main park road to Pine Island intersects the route of the Ingraham Highway near the borrow pit (see maps in Appendix G) and follows it for 1/2-mile to where it turns west at the Pine Island developed area. A portion of the original Ingraham Highway (east of the borrow pit) was removed by the National Park Service in the 1960s. This project will cut a 4 foot wide X 3' deep trench through the removed portion of the Ingraham Highway, where it meets the current park road by the borrow pit. Information regarding the removal procedures has not been found and there may be extant sub-surface features of the Ingraham Highway in this area of the project. If present, these features are likely to be posts and pilings similar to those uncovered during removal of the road across the Ingraham Highway in 1993. Construction activities would be monitored and contracts would include work-stoppage provisions if resources were discovered. As a result, implementation of the preferred alternative could have negligible to minor adverse effects on historic structures.

Although the park has not conducted a cultural landscape inventory, this project would occur in a development zone of the park, with modern roads, housing units, an air strip and administrative buildings. Loss of vegetation from construction activities would be negligible and both short- and long-term in duration. Implementation of the preferred alternative would have no adverse effects on eligible or potentially eligible cultural landscapes.

Although the park has not conducted an ethnographic resources inventory, this project would occur in a development zone of the park and there are no known ethnographic resources within the project area. Implementation of the preferred alternative could have negligible long-term adverse effects on ethnographic resources.

Implementation of the preferred alternative may have a minor beneficial effect for the museum collection if new artifacts are discovered or new information regarding construction techniques of the Ingraham Highway is discovered. Project documentation to be incorporated into the museum collection would provide a negligible beneficial effect.

Cumulative effects. Because the disturbance required to install the collection/transmission lines is not completely confined to previously disturbed sites, there is potential for this alternative to affect undisturbed *in-situ* cultural resources below the existing fill. Portions of the Ingraham Highway would be trenched for the installation of utility lines. This alternative may potentially make a minor contribution to long-term adverse cumulative effects on cultural resources at Everglades National Park or the surrounding area.

Conclusion. There is potential that construction in previously undisturbed areas (beneath existing fill) may affect previously unknown archaeological sites. Although trenching along the road is not expected to impact the intact Ingraham Highway, trenching for utility lines will cross a portion of the Ingraham Highway that was removed by the National Park Service in the 1960s. Extant sub-surface features that might be impacted in the removed areas are currently unknown. However, the entire 41-mile length of the Ingraham Highway is eligible for listing on the National Register of Historic

Places. This alternative may potentially make a minor contribution to long-term adverse cumulative effects on cultural resources at Everglades National Park.

Alternative B would not produce major adverse effects on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's Master Plan or other National Park Service planning documents. Consequently, there would be no impairment of cultural resources or values as a result of the implementation of Alternative B.

SECTION 106 SUMMARY

This environmental assessment provides detailed descriptions of two alternatives (including a no action alternative), analyzes the potential impacts associated with possible implementation of each alternative, and describes the rationale for choosing the preferred alternative. Also contained in the environmental assessment are mitigation measures that would help avoid adverse impacts on cultural resources (see Table 3).

Development of National Park Service facilities in the Pine Island area occurred in the decades that followed establishment of the park in 1947. Various maintenance and housing facilities were constructed between 1949 and 1959. A visitor center was constructed in the late 1950s or early 1960s. A modern chickee was added in 1969 but no significant structures were added again until 1992. At that time, Hurricane Andrew destroyed the visitor center and damaged other structures in the Pine Island area. Repairs to Pine Island facilities and the addition of aboveground fuel storage tanks, storage sheds and a mobile home occurred following Hurricane Andrew. The main park visitor center reconstruction was completed in 1996 and named in honor of Ernest F. Coe, a key leader in efforts to establish the national park. The recycling building at Pine Island was added in 1993, a hazardous materials storage building was added in 1997 and the laundry and restroom building was constructed in 1999. Most recently, a pump house structure was added in 2002.

The package plant would be placed on existing hardtop and no new excavation would be needed for its installation. The transmission lines would be located in trenches approximately 4 feet wide and 3 feet deep, located approximately 1 foot east of the eastern edge of the existing road. The raised infiltration beds would be placed on the existing airstrip. The infiltration beds would be limestone placed on top of existing grade. This would require removal of up to 4 inches of disturbed surface material in preparation for the new fill. There would be an approximately 2 feet deep trench for transmission pipes excavated to each of the infiltration beds. Project construction and trenching would occur in areas that are spatially (horizontally) previously disturbed. However, the depth of excavations for the transmission lines may impact previously undisturbed deposits in areas with less than 3 feet of fill. As a result, implementation of the preferred alternative could produce negligible adverse effects on the archaeological resources.

None of the buildings in the project area are on the park's List of Classified Structures or the National Register of Historic Places (Culhane pers. comm. 2002). The Ingraham Highway is on the park's List of Classified Structures and is eligible for the National Register of Historic Places. A National Register nomination for the 41-mile length of the Old Ingraham is currently being prepared by National Park Service staff at the Southeast Regional Office. Although altered (graded, widened and repaved), the road maintains enough integrity for the National Register nomination. The historic road was 37 feet wide in most places (NPS 2000b). Portions of the highway have been incorporated into the modern park road system and the utility line trench for this project would be dug approximately 1

foot east from the eastern edge of the existing road; therefore, it is not anticipated that the project would disturb those portions of the Ingraham Highway currently incorporated into the park's road system. The administrative road from the main park road to Pine Island intersects the route of the Ingraham Highway near the borrow pit (see maps in Appendix G) and follows it for 1/2-mile to where it turns west at the Pine Island developed area. A portion of the original Ingraham Highway (east of the borrow pit) was removed by the National Park Service in the 1960s. This project would cut a 4 feet wide and 3 feet deep trench through the removed portion of the Ingraham Highway, where it meets the current park road by the borrow pit. Information regarding the removal procedures has not been found and there may be extant sub-surface features of the Ingraham Highway in this area of the project. If present, these features are likely to be posts and pilings similar to those uncovered during removal of the road across the Ingraham Highway in 1993. Construction activities would be monitored and contracts would include work-stoppage provisions if resources were discovered. As a result, implementation of the preferred alternative could have negligible to minor adverse effects on historic structures.

While largely occurring in previously disturbed areas, this project's trenching and construction would impact both the Ingraham Highway and previously undisturbed areas beneath the existing fill level. Some areas have been previously disturbed or filled, but because Pine Island has never been archeologically tested, the extent of such disturbance (depth of fill) is unknown. The topography of the Everglades is such that human activity (prehistoric, historic, and modern) is generally limited to the raised areas like Pine Island, and archeological sites are common in such areas (NPS 2003). Significant archeological resources are known to exist near (but not in) the project area. To determine the levels of previous disturbance, to avoid damage to previously unknown archaeological resources and to determine if original fabric from the Ingraham Highway remains in areas where it might be impacted by project construction, the National Park Service's Southeast Archaeological Center would conduct archaeological survey and testing activities in previously undisturbed areas prior to ground disturbing activities. If any resources are encountered, adequate mitigation of project impacts (in consultation with appropriate agencies) or adjustment of the project design would take place to avoid or limit the adverse effects on prehistoric and historic archaeological resources.

In keeping with 36 CFR 800.8 (c) et seq, this environmental document will utilize the NEPA process for accomplishing Section 106 compliance. To this end, the environmental assessment has identified consulting parties who were contacted during the scoping process, including the Florida State Historic Preservation Office (SHPO) and affiliated Native American tribes (see Appendix A: Compliance Correspondence). Letters inviting consultation on this project were sent to the Seminole Tribe of Florida, Seminole Nation of Oklahoma and the Miccosukee Tribe of Indians of Florida. Scoping comments were also invited from the Osceola Camp group of independent Miccosukees. A response was received from the Seminole Tribe of Florida, declining government-to-government consultation of this project (see Appendix A: Compliance Correspondence). No responses were received from the Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Oklahoma or the Osceola group of independent Miccouskees.

During early stages of planning for this project, the Area of Potential Effect was defined, and files were searched to identify any historic properties that might be affected by this project. The project will be reviewed by the National Park Service Southeast Archeological Center and the National Park Service Regional Historian.

The environmental assessment will be sent to affiliated Native American groups for their review and comment to ensure that no ethnographic resources valued by tribes would be affected by project implementation. This environmental document also will be sent to the Florida State Historic

Preservation Officer (SHPO) for review and comment and for SHPO concurrence with the National Park Service's definition of the Area of Potential Affect. This environmental assessment finds that the project could have a negligible to minor adverse effect on known historic properties listed in or eligible for inclusion in the National Register of Historic Places; concurrence with this determination also will be sought from the Florida SHPO.

In the unlikely event that cultural resources are encountered during project implementation, work will be halted and the discovery process would be initiated as outlined in 36 CFR 800.13.

Pursuant to 36 CFR 800.5, implementing regulations of the National Historic Preservation Act (NHPA) (revised regulations effective January 2001), addressing the criteria of effect and adverse effect, the National Park Service finds that the implementation of the installation of a new centralized wastewater treatment facility and new wastewater collection/transmission system throughout the Pine Island developed area would result in no adverse effects to archeological resources, ethnographic resources, cultural landscapes or museum collections eligible for or listed on the National Register of Historic Places. Because of potential impacts to the Ingraham Highway, the project may potentially result in a negligible to minor adverse affect to a historic structure eligible for the National Register of Historic Places. However, the presence or absence of eligible resources can not be determined until completion of the survey planned by the Southeast Archeological Center. The results of the investigation will be provided to the SHPO with an appropriate recommendation, in compliance with 36 CFR 800.

PUBLIC HEALTH AND SAFETY

Affected Environment

Everglades National Park is responsible for maintaining safe conditions for the protection of the health and safety of both its employees and the public and is subject to the provisions of the law applicable to units of the National Park Service. This not only applies to providing safe facilities, utilities, and grounds within the park, but also includes National Park Service program and project operations.

The proposed project area encompasses the Ernest F. Coe Visitor Center, park headquarters, the main park entrance station, a park staff housing development, and the roadways running between these facilities. In 2001, 193,365 people visited the Ernest F. Coe Visitor Center and 465,787 (Scott pers. comm. 2002) passed though the main entrance station. Park staff and their families comprise approximately 70 full-time residents of the housing development.

Park visitors as well as staff and their families rely on the water provided at the above mentioned facilities for drinking, washing and flushing toilets. Resultant wastewater is currently treated in separate septic tank/drainfield systems; many of which are at or beyond capacity, in need of repair, or have periodically saturated drainfields causing them to function improperly possibly discharging into groundwater. No contamination has been detected to date.

Impacts of Alternative A: No Action / Continue Current Management

Under the no action alternative separate, aging septic systems would continue to be utilized for wastewater disposal at the park headquarters, Ernest F. Coe Visitor Center, main park entrance station, and staff housing development. This continued use would bring with it the possibility of groundwater contamination. The probability of effluent seeping into groundwater, and the related

probability of pathogens entering the potable water supply, is low. Nevertheless, this potential would be considered a minor, adverse and localized impact on public health and safety.

Cumulative effects. Potable water system improvements serving Pine Island as well as potable water and wastewater system improvements planned for the Flamingo area would benefit public health and safety by reducing the risk for human contact with water-borne pathogens. The no action alternative would not reduce, and in fact would increase this risk, detracting from the objective of these other projects. Overall, improvement projects within Everglades National Park would result in long-term, minor to moderate beneficial impacts to public health and safety. However, the long-term, negligible to minor, adverse impact of this alternative would diminish the overall benefit of these other plans.

Conclusion. Under the no action alternative the potential for groundwater to be contaminated by inadequate septic systems would persist. This would directly impact park staff and visitors since this water is used as the potable water supply. The potential for contamination would be considered a long-term, minor, adverse and localized impact on public health and safety.

Potable water system improvements serving Pine Island as well as potable water and wastewater system improvements planned for the Flamingo area would benefit public health and safety by reducing the risk for human contact with water-borne pathogens. The no action alternative would not reduce, and in fact would increase this risk, detracting from the objective of these other projects. Overall, improvement projects within Everglades National Park would result in long-term, minor to moderate beneficial impacts to public health and safety. However, the long-term, negligible to minor, adverse impact of this alternative would diminish the overall benefit of these other plans.

Impacts of Alternative B: The Preferred Alternative

Existing septic systems would be abandoned in accordance with applicable regulations as a means of wastewater disposal under the preferred alternative. As a result the potential for effluent from these systems to contaminate groundwater (potable water supply) would be alleviated. This reduces the risk of human exposure to water-borne pathogens resulting in a beneficial, long-term, minor impact to public health and safety.

This alternative would also involve the construction of a small wastewater treatment plant to replace the septic systems. During construction of the plant and associated raised infiltration beds, fill would be delivered from outside of the park. This would result in possible traffic interactions at the visitor center intersection. Delivery crews would use caution, but accidents may still occur. Increased potential for accidental collisions would be considered a short-term, minor, adverse impact.

Maintenance of the wastewater treatment plant would require operators to be in close proximity or in direct contact with untreated wastewater, its associated pathogens, and hazardous chemicals used during plant operation. While the preferred alternative would reduce the number of people potentially coming into contact with water-borne pathogens, the risk to operator safety would present a long-term, negligible, adverse impact.

Cumulative effects. Potable water system improvements serving Pine Island as well as potable water and wastewater system improvements planned for the Flamingo area would benefit public health and safety by reducing the potential for human contact with water-borne pathogens. The preferred alternative would result in a similar reduction, adding cumulatively to long-term, minor to moderate, regional, beneficial impacts on public health and safety.

Conclusion. The reduced risk of human contact with water-borne pathogens would be considered a long-term, minor, beneficial impact of the preferred alternative. Conversely, negligible long-term, adverse impacts would arise from the increased risk to individuals tasked with wastewater treatment plant operation as they would be more likely to come in contact with these water-borne pathogens and hazardous chemicals used in the plant.

In the short-term, increased accident potential within the proposed project area, resulting from fill delivery, would pose a minor, adverse impact to public health and safety.

Potable water system improvements serving Pine Island as well as potable water and wastewater system improvements planned for the Flamingo area would benefit public health and safety by reducing the potential for human contact with water-borne pathogens. The preferred alternative would result in a similar reduction, adding cumulatively to long-term, minor to moderate, regional, beneficial impacts on public health and safety.

VISITOR USE AND EXPERIENCE

Affected Environment

From 1998 to 2001 parkwide visitation has consistently been about one million recreational visits. Visitation to the Ernest F. Coe Visitor Center is estimated at approximately 186,000 visitors per year. Approximately ½ million visitors pass through the main park entrance at Pine Island which provides the only access to Royal Palm Visitor Center/interpretive area; Long Pine Key campground, picnic site, and trailhead; Flamingo Visitor Center and developed area; and interpretive stops along the main park road between Pine Island and Flamingo.

Approximately 554,000 visitors passed through the main park entrance in 2001. Of the total number of visitors passing through the main park entrance, approximately 34% (188,644) stopped at the Ernest F. Coe Visitor Center. The average length of stay at the visitor center was approximately 30 minutes.

Impacts of Alternative A: No Action / Continue Current Management

If the no action alternative were to be implemented, the continued deterioration of the existing septic/drainfield wastewater system and resulting repairs would have a short-term, minor, adverse effect on the visitor experience because of the inconvenience to visitors of having to use portable toilets at the main visitor center during minor repairs. Also, the odor associated with raw sewage due to system failure or repair would also have short-term, minor, adverse effects on visitors entering or exiting the main visitor center. In the event of frequent repairs or repairs that required an extended time period, the park would have to use a less temporary solution of providing platform trailers with portable toilets and special pump/connections to transport and discharge sewage into other operational septic/drainfield systems. Frequent repairs or an extended service outage would have a more long-term, minor to moderate adverse effect, creating a negative perception, diminishing what would have otherwise been a valuable visitor experience.

Cumulative effects. Depending on the values and interests of each visitor, a scene containing the existing Pine Island development infrastructure, including the addition of the new water wells/pump approximately 150 feet west of the existing headquarters/visitor center drainfield, and the additional traffic passing through this area associated with the construction of the new Flamingo water and wastewater treatment system, could have a beneficial or adverse incremental cumulative effect. Some might interpret the scene as a desirable indicator of what is necessary to support a national park

experience and opportunity. Others might interpret the scene as an encroachment on this tropical landscape scene. Because the main attraction of this isolated project area is the visitor center, it is unlikely that other infrastructure and operational activities would generally be considered more than a negligible to minor, adverse cumulative effect on the visitor experience, especially when considered in the context of a park that comprises more than a million acres.

Conclusion. The no action alternative would have a short-term, minor adverse effect on visitor use and experience due to the deteriorating condition of the existing wastewater treatment system and the resulting occasional toilet outages that would be expected to occur at the main park visitor center. However, if frequent repairs or an extended service outage were required, the park would have to use a less temporary solution for providing portable toilet facilities. This would have a more long-term, minor to moderate adverse effect, creating a negative perception, diminishing what would have otherwise been a valuable visitor experience.

Depending on the values and interests of each visitor, a scene containing the existing Pine Island development infrastructure, including the addition of the new water wells/pump approximately 150 feet west of the existing headquarters/visitor center drainfield, and the additional traffic passing through this area associated with the construction of the new Flamingo water and wastewater treatment system, could have a beneficial or adverse incremental cumulative effect. Some might interpret the scene as a desirable indicator of what is necessary to support a national park experience and opportunity. Others might interpret the scene as an encroachment on this tropical landscape scene. Because the main attraction of this isolated project area is the visitor center, it is unlikely that other infrastructure and operational activities would generally be considered more than a negligible to minor, adverse cumulative effect on the visitor experience, especially when considered in the context of a park that comprises more than a million acres.

Impacts of Alternative B: The Preferred Alternative

The preferred alternative would have a short-term, negligible adverse impact on visitor use and experience because the construction activity for the new wastewater treatment plant would be occurring adjacent to the park's housing/maintenance area, which is 1.1 miles from the main visitor center. The park's housing/maintenance area is and would continue to be a "no entry" area for visitors. Also, construction vehicles would use the park road bypass, avoiding the visitor center entrance access road/parking area. The visitor would not be adversely affected by the switchover from the existing treatment system to the new package wastewater treatment plant because this two hour operation would take place at night or during low visitor use periods. Since the existing system of septic tanks and drainfield lines would be abandoned in place, there would be no disruptions or intrusions; however, there would likely be a short-term, negligible adverse effect on visitors entering or exiting the main visitor center during the short construction period when the new wastewater pump/collection lines are being installed. Noise from the new wastewater collection pumps would not affect visitors because they would be buried underground. Because the new raised infiltration beds would be signed as a "no entry" area, the small number of hikers who might be utilizing the cypress dome area would be negligibly affected by the presence of these two raised infiltration beds.

The preferred alternative would have a long-term, moderate, beneficial effect on the visitor experience because the new wastewater treatment system (pump/collection line system, package wastewater treatment plant, effluent disposal lines, and raised infiltration beds) would ensure that the Pine Island developed area would be capable of providing an effective and reliable system that would meet the basic needs of visitors during their stay at the park.

Cumulative effects. Depending on the values and interests of each visitor, a scene containing the existing Pine Island development infrastructure, including the new wastewater treatment facility, the addition of the new water wells/pump approximately 150 feet west of the existing headquarters/visitor center drainfield, and the additional traffic passing through this area associated with the construction of the new Flamingo water and wastewater treatment system, could have a beneficial or adverse incremental cumulative effect. Some might interpret the scene as a desirable indicator of what is necessary to support a national park experience and opportunity. Others might interpret the scene as an encroachment on this tropical landscape scene. Because the main attraction of this isolated project area is the visitor center, it is unlikely that other infrastructure and operational activities would generally be considered more than a negligible to minor, adverse cumulative effect on the visitor experience, especially when considered in the context of a park that comprises more than a million acres.

Conclusion. The preferred alternative would have a short-term, negligible adverse effect due to the minimal construction activity that would occur in the prime visitor use area and the diversion of construction traffic along the main visitor center's bypass road. The preferred alternative would have a long-term, moderate, beneficial effect on the visitor experience because the new wastewater treatment system (pump/collection line system, package wastewater treatment plant, effluent disposal lines, and raised infiltration beds) would ensure that the Pine Island developed area would be capable of providing an effective and reliable system that would meet the basic needs of visitors during their stay at the park.

Depending on the values and interests of each visitor, a scene containing the existing Pine Island development infrastructure, including the new wastewater treatment facility, the addition of the new water wells/pump approximately 150 feet west of the existing headquarters/visitor center drainfield, and the additional traffic passing through this area associated with the construction of the new Flamingo water and wastewater treatment system, could have a beneficial or adverse incremental cumulative effect. Some might interpret the scene as a desirable indicator of what is necessary to support a national park experience and opportunity. Others might interpret the scene as an encroachment on this tropical landscape scene. Because the main attraction of this isolated project area is the visitor center, it is unlikely that other infrastructure and operational activities would generally be considered more than a negligible to minor, adverse cumulative effect on the visitor experience, especially when considered in the context of a park that comprises more than a million acres.

WILDERNESS

Affected Environment

Approximately 86 percent of Everglades National Park was designated as the "Everglades Wilderness" by Congress in 1978. This large wilderness area was renamed to honor the famous Everglades activist, Marjory Stoneman Douglas, in 1997. The wilderness area contains 1,296,500 acres of the total 1,509,000 acres comprising Everglades National Park. These lands are now shielded from development encroachment and are managed to protect the flora and fauna of the Everglades ecosystem. This is the largest wilderness in the southeastern United States and provides vital habitat for many species (NPS 2000).

Since the park was established, construction of facilities has progressed with a concept of preserving wilderness qualities and keeping development to a minimum. The developed areas within Everglades

National Park remain basically unchanged from the 1960s and are limited to less than 0.1 percent of total park lands (NPS 2000).

Principles of wilderness management include “leave no trace” camping, minimizing wildlife disturbance, and excluding use of motors and mechanized equipment. These strategies are intended to protect high quality wilderness and values present in this unique setting.

The Pine Island and headquarters developed area (isolated in a non-wilderness area) has already been studied and is not recommended or proposed for wilderness designation (see Figure 8). The nearest wilderness lands to the project area are located 300 feet north of the park entrance station and 900 feet south of the abandoned Pine Island airstrip. No proposed work would take place within wilderness boundaries.

Impacts of Alternative A: No Action / Continue Current Management

The no action alternative would continue use and maintenance of the existing septic systems and drainfields. No disturbance of previously undisturbed areas or facilities expansion would occur. Because this alternative is free from construction activities and leaves the abandoned airstrip intact, there would be no effect on wilderness.

Cumulative effects. Being at the eastern boundary of the park, with agriculture and rural development immediately adjacent to the east, impacts of Pine Island development on wilderness have likely been minimal. Roads through the park, constructed decades ago, have transected the wilderness, impeding wildlife movement and water flow. The no action alternative would make no contribution to cumulative adverse effects on wilderness at Everglades National Park.

Conclusion. Because there would be no facility expansion or disturbance in or adjacent to designated wilderness, the no action alternative would have no effect on wilderness at Everglades National Park.

Being at the eastern boundary of the park, with agriculture and rural development immediately adjacent to the east, impacts of Pine Island development on wilderness have likely been minimal. Roads through the park, constructed decades ago, have transected the wilderness, impeding wildlife movement and water flow. The no action alternative would make no contribution to cumulative adverse effects on wilderness at Everglades National Park.

Alternative A would not produce major adverse impacts on wilderness resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park’s general management plan or other National Park Service planning documents. Consequently, there would be no impairment of wilderness resources or values as a result of the implementation of Alternative A.

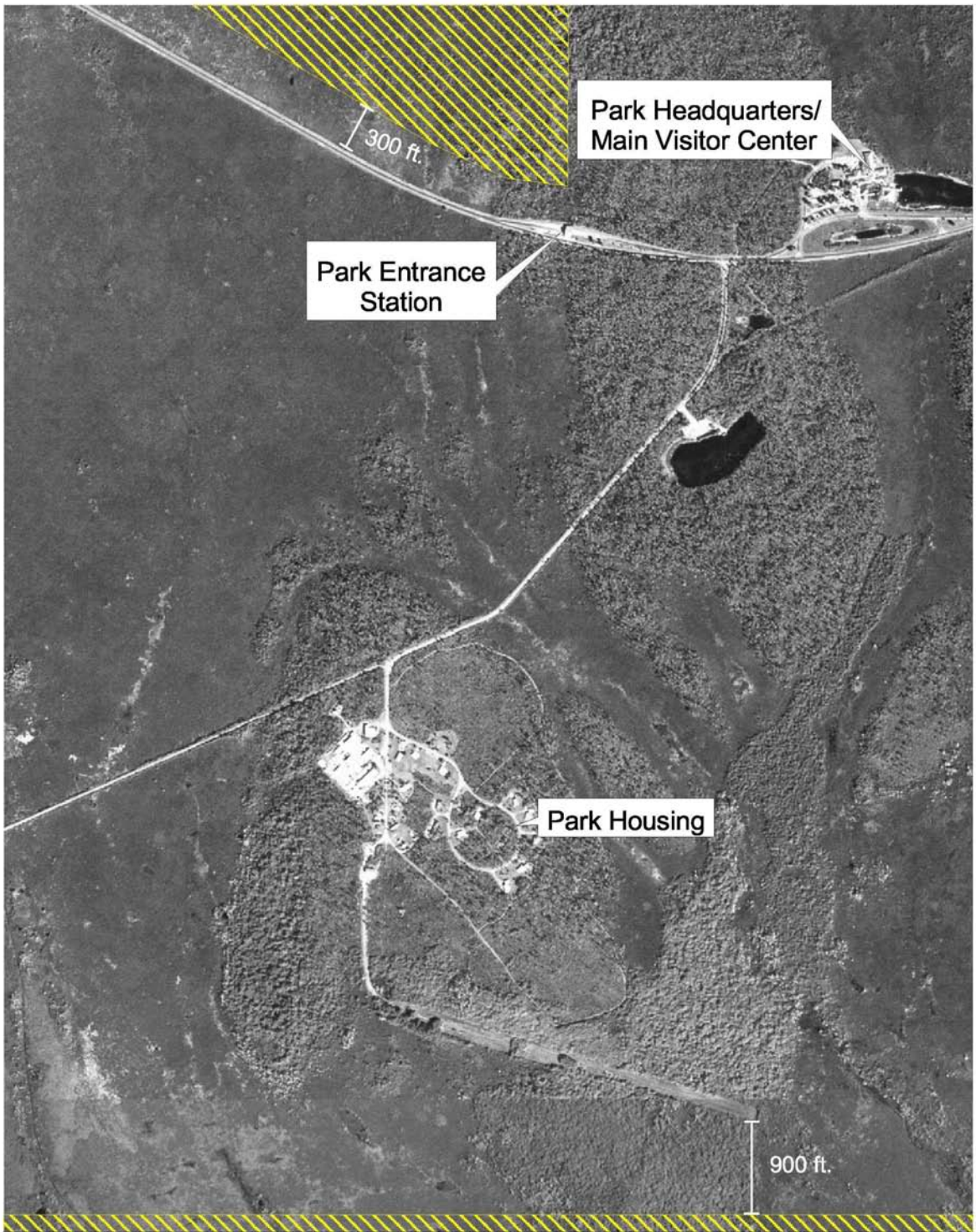

Figure 8: Designated Wilderness Near Pine Island

Impacts of Alternative B: The Preferred Alternative

Installation of the wastewater collection system within the Pine Island developed area would not be likely to affect wilderness values. However, construction of the raised infiltration beds on the abandoned airstrip and installation of the wastewater main from the package plant to the new raised infiltration beds would occur approximately 900 feet from designated wilderness. No construction activities would occur at night to avoid effects on nocturnal species in the adjacent wilderness.

Construction activities would result in visual and noise intrusions which could have minor, localized, short-term, adverse effects on wilderness character. The disturbance to the quiet and solitude of the nearby wilderness would be affected by the noise and presence of heavy equipment and work crews only for the duration of construction.

Once the new wastewater system was complete, the package plant blowers would operate continuously. The noise generated by the blowers is anticipated to be less than that of a window air-conditioning unit (Lynn pers. comm. 2002). In addition, the backup diesel generator would run 4 hours each month to assure proper operation in the event of an emergency. The new raised infiltration beds would be developed on the previously abandoned airstrip, which is largely surrounded by dense stands of Brazilian pepper. The density of vegetation would serve as a mitigation factor to the visual effects of the long-term presence of the raised infiltration beds and elevated berms. The components of the new facility located near designated wilderness would produce long-term, negligible adverse effects on wilderness in the immediate vicinity of the facility. No widespread effects would occur.

Cumulative effects. Implementation of the preferred alternative would, over both the short- and long-term, contribute at a low level, to the cumulative, adverse effects that already exist due to the intrusion into wilderness by human visitation and development. However, this plan does not expand development into wilderness, nor will it cause increased human presence in wilderness. Therefore, the cumulative effect of this alternative would be negligible.

Conclusion. Implementation of the preferred alternative would result in minor, short-term, adverse effects on wilderness resources. These effects would be due to the noise and disruption generated by construction equipment and work crews. This alternative would also produce long-term adverse effects of negligible intensity caused by the visual intrusion of the raised infiltration beds and the continual low level of noise from the package plant blowers and occasional sound of generator operation.

Implementation of the preferred alternative would, over both the short- and long-term, contribute at a low level, to the cumulative, adverse effects that already exist due to the intrusion into wilderness by human visitation and development. However, this plan does not expand development into wilderness, nor will it cause increased human presence in wilderness. Therefore, the cumulative effect of this alternative would be negligible.

Alternative B would not produce major adverse impacts on wilderness resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other National Park Service planning documents. Consequently, there would be no impairment of wilderness resources or values as a result of the implementation of Alternative B.

PARK OPERATIONS

Affected Environment

The superintendent at Everglades National Park is responsible for managing the park, its staff, concessionaires and residents, all of its programs, and its relations with persons, agencies, and organizations interested in the park.

Park staff provide the full scope of functions and activities to accomplish management objectives and meet requirements in law enforcement, emergency services, public health and safety, science, resource protection and management, visitor services, interpretation and education, community services, utilities, housing, and fee collection.

Staff duties associated with the existing septic/drainfield systems include:

monitoring of the septic/drainfield operation;

periodic maintenance associated with the aging septic/drainfield system; and

pumping-out the 32 septic tanks approximately once every five years and occasional repair of drainfields.

Additional burden is placed on the staff due to the age of the existing septic system components. Many of the existing septic/drainfield systems have been in operation since the late 1950s. The system is in various stages of deterioration and requires periodic repairs.

Impacts of Alternative A: No Action / Continue Current Management

The existing septic/drainfield systems are not out of compliance with state standards because they were "grandfathered" in as a pre-existing condition at the time when more stringent standards were established.

The existing septic/drainfield system has been in place for approximately 40 years. The system is in an advanced stage of deterioration, requiring periodic attention. Issues of concern include:

frequent monitoring of the septic tank and drainfields to reduce the potential for system failure; and

periodic pump-out of the septic tanks and repair and maintenance of the aging drainfields.

Under the no action alternative, the maintenance intensity of the existing septic systems would continue to have a short- and long-term, minor adverse effect on park operations due to the continued monitoring, maintenance, and repair of the drainfield system and the periodic pump-out of the septic tanks.

Cumulative effects. Everglades National Park has proposed several relatively large-scale projects, including water and wastewater improvement projects at both Flamingo and Pine Island.

In addition to duties related to the existing septic/drainfield systems, the maintenance staff would monitor and maintain the operation and maintenance of the new:

potable water well/pump system operation adjacent to the Pine Island headquarters/main visitor center drainfield that was completed in June 2002;

reverse/osmosis potable water treatment system at Flamingo scheduled for completion in November 2003; and

wastewater treatment plant system at Flamingo scheduled for completion in August 2004; and numerous other water treatment systems throughout the park.

Maintenance, operation, and repair of three new systems above plus the existing septic/drainfield system at Pine Island would pose a long-term, negligible to minor cumulative adverse effect on park operations, and the potential exists for current conditions to worsen slightly as the existing Pine Island wastewater system ages.

Conclusion. Under the no action alternative, the maintenance intensity of the existing wastewater treatment system would continue to have a short- and long-term minor, adverse effect on park operations due to the continued monitoring, maintenance, and repair of the drainfield system and the periodic pump-out of the septic tanks.

Maintenance, operation, and repair of three new systems described above at the Pine Island and Flamingo developed areas, plus the existing septic/drainfield system at Pine Island, would pose a long-term, negligible to minor cumulative adverse effect on park operations, and the potential exists for current conditions to worsen slightly as the existing Pine Island wastewater system ages.

Impacts of Alternative B: The Preferred Alternative

The new wastewater package treatment plant and effluent disposal system (raised infiltration beds) would meet or be below all current Florida Department of Environmental Protection effluent standards. This would be considered a short- and long-term, minor to moderate, beneficial effect to park operations compared to the no action alternative.

Operators would need training for the new, more technically demanding equipment. In the short-term, this would cause some difficulty related to the time involved in training and a continued lack of qualified staff while training is occurring. Resultant impacts would be negligible to minor and adverse.

In the long-term, once trained, emphasis would focus on maintenance of the new wastewater treatment package plant system. Although the preferred action would eliminate the monitoring and maintenance now associated with the existing septic/drainfield treatment system, the new wastewater package treatment system would require:

increased maintenance associated with new collection/transmission lines, lift stations, and package treatment plant;

increased costs associated with the maintenance of the existing airstrip road and raised infiltration beds;

periodic removal of sludge from the new package treatment plant system;

a licensed operator for the new package treatment plant;

additional personnel time to comply with operational permitting requirements; and

increased costs associated with power consumption (electricity and generator fuel) and the purchase and handling of chemicals associated with the new package treatment plant process.

Cumulative effects. Everglades National Park has proposed several relatively large-scale projects, including water and wastewater improvement projects at both Flamingo and Pine Island.

In addition to duties related to the new Pine Island package wastewater treatment system, the maintenance staff would have to monitor and maintain the operation and maintenance of the new:

potable water well/pump system operation adjacent to the Pine Island headquarters/main visitor center drainfield that was completed in June 2002;

reverse/osmosis potable water treatment system at Flamingo scheduled for completion in November 2003; and

wastewater treatment plant system at Flamingo scheduled for completion in August 2004.

The cumulative burden placed on staff as a result of working on and overseeing these four new projects as well as educating the public about them and why they are necessary would cause minor to moderate, short- and (depending on the extent and length of the project) long-term, adverse effects on park operations.

These impacts are, however, somewhat offset by the minor to moderate, beneficial cumulative effects associated with the removal of these antiquated, maintenance intensive systems and the installation of new ones. In the long-term, park staff would be relieved of many tasks, including constant repair of the systems and notification of the public about repairs, and would be able to focus on providing high quality drinking water and wastewater treatment.

Conclusion. The preferred alternative would result in some short-term, minor, adverse effects to park operations related to the training of staff on the new, more technically demanding system. However, long-term, minor to moderate, beneficial effects would be anticipated with the implementation of a high quality wastewater system.

Everglades National Park has proposed several relatively large-scale projects, including water and wastewater improvement projects at both Flamingo and Pine Island.

In addition to duties related to the new Pine Island package wastewater treatment system, the maintenance staff would have to monitor and maintain the operation and maintenance of the new:

potable water well/pump system operation adjacent to the Pine Island headquarters/main visitor center drainfield that was completed in June 2002;

reverse/osmosis potable water treatment system at Flamingo scheduled for completion in November 2003; and

wastewater treatment plant system at Flamingo scheduled for completion in August 2004.

The cumulative burden placed on staff as a result of working on and overseeing these four new projects as well as educating the public about them and why they are necessary would cause minor to

moderate, short- and (depending on the extent and length of the project) long-term, adverse effects on park operations.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

Sustainability is the result achieved by doing things in ways that do not compromise the environment or its capacity to provide for present and future generations. The National Park Service Guiding Principles of Sustainable Design (1993) directs National Park Service management philosophy. It provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The guidebook articulates principles to be used in the design and management of visitor facilities that emphasize environmental sensitivity in construction, use of non-toxic materials, resource conservation, recycling, and integration of visitors with natural and cultural settings.

Continuation of the no action alternative would prolong the discharge of inadequately treated effluent to local groundwater. This is contrary to the National Park Service policy of meeting the most stringent of criteria applicable within each park. In addition, the potential exists for discharges to affect resources of the park, including Outstanding Florida Waters. In addition, the potential exists for the public and staff to be exposed to untreated sewage in the event of system failure.

To protect park resources and public health and safety, the park has proposed to replace the existing septic systems and drainfields with a new centralized wastewater treatment facility. The proposed action would reduce the likelihood of effects to natural resources from migration of untreated effluent. In addition the health and safety of staff and visitors would be improved because septic system failures would cease. Such actions would conform to National Park Service policy mandating protection of resources into perpetuity.

Unavoidable Adverse Impacts

The Pine Island developed area was originally constructed on fill material within the coastal plain. The site includes visitor facilities, park housing, and operations components. Beyond the immediate vicinity, the hydrology and vegetation of the region have been disturbed by large-scale water control and management structures placed throughout the Everglades ecosystem. Neither alternative considered for this analysis would remove or substantially change the effects of these actions on the project area.

CONSULTATION AND COORDINATION

Scoping is the effort to involve agencies and the general public in determining the scope of issues to be addressed in the environmental document. Among other tasks scoping determines important issues and eliminates issues not important; allocates assignments among the interdisciplinary team members and other participating agencies; identifies related projects and associated documents; identifies other permits, surveys, consultations required by other agencies; and creates a schedule which allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made. Scoping includes any interested agency or any agency with jurisdiction by law or expertise (including the Advisory Council on Historic Preservation, the State Historic Preservation Officer, and Indian tribes) to obtain early input.

During scoping for this environmental assessment, the park contacted the Seminole Tribe of Florida, the Seminole Nation of Oklahoma, the Miccosukee Tribe of Indians of Florida, and a group of traditional/independent Miccosukees via letter on January 27, 2003. Copies of these letters can be found in Appendix A. Copies of this environmental assessment will be sent to the three tribes and also to a group of independent/traditional Miccosukees. One response to the scoping letter was received from the Seminole Nation of Oklahoma. The Tribe expressed no interest in commenting on the project. A copy of this response can be found in Appendix A.

During development of this environmental assessment, the park contacted the Florida State Historic Preservation Officer regarding the project. A copy of the letter sent to the Florida State Historic Preservation Officer and Advisory Council can be found in Appendix A.

The U.S. Fish and Wildlife Service was contacted by letter regarding this project on January 28, 2003. A copy of this letter requesting verification of threatened and endangered species in the project area is located in Appendix A.

The Florida Department of Environmental Protection was contacted regarding this project on February 5, 2003. This letter may also be found in Appendix A.

During scoping for this environmental assessment, the park provided the Florida State Clearinghouse with the scoping notice for processing through appropriate state agencies.

PLANNING TEAM PARTICIPANTS

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Skip Snow	Biologist	NPS, Everglades National Park
Tom Armentano	Plant Specialist	NPS, Everglades National Park
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Mark Norman	Environmental Scientist	Parsons
Connie Chitwood	Statement of Finding Specialist	Parsons

LIST OF RECIPIENTS THAT RECEIVED THE SCOPING BROCHURE

(see Appendix F)

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2003 Letter from Charles Lawson, Section 106 Compliance, Southeast Archaeological Center (SEAC) to Tom Murphy and Brien Culhane, dated 4/14/2003.

U.S. Environmental Protection Agency

1963 Reauthorization and amendments of the 1963 Clean Air Act, 42 USC 7401.

Weissman, Brent Richards

1999 *Unconquered People: Florida's Seminole and Miccosukee Indians*. University Press of Florida, Gainesville, FL.

Working Group of the South Florida Ecosystem Restoration Task Force

1998 Success in the Making, An Integrated Plan for South Florida Ecosystem Restoration and Sustainability. November 1998.

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APPENDIX A

COMPLIANCE/CORRESPONDENCE

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Scoping Report
Pine Island/Headquarters Wastewater System Improvements
Environmental Assessment

Introduction

Scoping is an early and open process to determine public and internal concerns relating to a proposed action. Although public scoping is not required for an environmental assessment, the National Park Service conducted scoping for this new wastewater system for the Pine Island developed area to ensure input from all interested stakeholders.

Between January 22 and 28, 2003, a scoping notice was distributed to approximately 650 individuals, organizations, agencies and American Indian Tribes via U.S. mail and email. This notice announced the park's intent to prepare an environmental assessment to address alternatives for improving the wastewater treatment system at the Pine Island and Headquarters developed area. It described preliminary alternatives and resource considerations, and identified opportunities for public participation in the environmental assessment process. The notice invited interested parties to submit their initial views or concerns regarding the project to the park superintendent.

The scoping notice was posted and distributed at the Ernest F. Coe Visitor Center, park headquarters, and placed on the Everglades National Park website at http://www.nps.gov/ever/planning. A press release announcing the initiation of scoping and inviting public participation in the planning process was emailed to South Florida media outlets on January 22, 2003.

Public scoping workshops were held at the Ernest F. Coe Visitor Center and at the Florida City Hall on February 10, 2003. The purpose of the workshops was to: 1) provide participants with an overview of existing conditions and the proposed action; 2) ask participants to identify key issues that should be analyzed during the environmental review and compliance process; and 3) provide an opportunity for participants to comment and ask questions regarding project alternatives and the planning process. There were no attendees at the public scoping workshops.

This *Scoping Report* summarizes the comments received during the public comment period, which was open from January 22 to February 25, 2003. A total of 7 comments were received via U.S. mail and email.

Summary of Scoping Comments and NPS Responses

The comments, concerns and suggestions of the respondents fell into 3 categories: 1) project scope, 2) preliminary alternatives, and 3) consultation and coordination.

PROJECT SCOPE

1. What priority have you given to the Royal Palm visitor center? This center has a large number of visitors and is located right in the [Taylor] slough. Any wastewater contamination would be likely to reach moving water very quickly. Should it not be a priority? In contrast, the septic systems from the employee housing are in a pineland area, with, I assume, much more limited groundwater movement.

NPS Response: *The Royal Palm Visitor Center is outside the scope of this project, and is not geographically situated to allow practical connection to this project. With the exception of the Flamingo community, existing treatment for all facility wastewater treated within the park consists of septic tanks and drainfields. This project will address the largest amount of wastewater flow in the park outside of Flamingo. Improved/upgraded treatment for other facilities in the park will be addressed by separate, future projects.*

PRELIMINARY ALTERNATIVES

2. Alternative 1 [no action – continue current wastewater treatment]: even though this is a low cost alternative, it is not environmentally sound. This option does not meet Florida Department of Environmental Protection (FDEP) requirements and is not recommended.

   NPS Response: *Comment noted.*

3. Alternative 2 is environmentally sensible and is recommended.

   NPS Response: *Comment noted.*

4. As an alternative to the percolation ponds, Alternative 2 should consider re-use of treated water (reclaimed water) for non-potable purposes (e.g. landscape irrigation, flush toilets, cleaning, etc). The effluent water quality will meet advanced treatment FDEP requirements and should be suitable for reuse.

   NPS Response: *This alternative will be addressed in the environmental assessment.*

5. The proposed system [Alternative 2] should be designed to consistently produce the effluent quality desirable and to handle variable hydraulic and loading rates. It should also be energy efficient, require minimum chemical usage, generate minimum residuals and effluent solids, and be easy to operate.

   NPS Response: *Comment noted.*

6. To avoid operational problems due to the daily and seasonal variations in hydraulic and organic loading to the plant, it is recommended that the wastewater treatment plant include a flow equalization basin ahead of the biological process. The equalization tank evens out the daily input cycle and provides a steady flow to the treatment process, guaranteeing constant optimal performance.

   NPS Response: *A flow equalization tank is expected to be included as part of the wastewater treatment process.*

7. The proposed system [Alternative 2] should included advanced tertiary treatment following the biological process for Biological Oxygen Demand (BOD-5) and Total Suspended Solid (TSS) removal. Nutrient removal, chemical addition, filtration, and disinfection are unit processes that should be considered necessary to meet the desired effluent quality.

NPS Response: *Comment noted.*

8. 2010 FDEP standards might be very stringent and require high disinfection for removal of Emergent Pollutants or Concern (e.g. endocrine disruptors, pharmaceuticals, etc.).

NPS Response: *Comment noted.*

9. The park should consider other, similar treatment systems currently in operation in the Florida Keys. This should be considered during the next step to collect data and assess effects of alternatives.

NPS Response: *Comment noted.*

10. Due to the small size of the treatment system, it is recommended that the operation of the treatment system be contracted or out-sourced with a certified operator.

NPS Response: The park employs licensed operators that will maintain and operate this wastewater treatment plant.

CONSULTATION AND COORDINATION

11. Based on the information provided in the scoping notice it is the opinion of the Florida State Historic Preservation Officer that the proposed project will have no effect on historic properties.

NPS Response: *Comment noted.*

12. If a dredge and fill of the wetlands will occur incident to the project an U.S. Army Corps of Engineers permit will be required. Detailed plans, the size of the impact, alternatives considered and the cubic yardage of fill [should there be wetlands impacted] must be stated in the EA and permit application.

NPS Response: *Comment noted.*

13. To construct and operate a wastewater treatment plant in Miami-Dade County, the park will need to comply with requirements of the "Permitting application package for a new domestic wastewater treatment facilities" which include:
    - Miami-Dade County Environmental Quality Control Board approval;
    - Miami-Dade County Environmental Resources Management (DERM) application to construct a Domestic Wastewater Facility;
    - DERM annual Operating Permit;
    - Florida Department of Environmental Protection (FDEP), delegated by FDEP to DERM

NPS Response: *Comment noted.*

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Pine Island/Headquarters Wastewater System Improvements

ENVIRONMENTAL ASSESSMENT **January 2003**

SCOPING NOTICE

The National Park Service (NPS) is preparing an environmental assessment (EA) to address options for improving wastewater treatment in the Pine Island and Headquarters areas within Everglades National Park, Miami-Dade County, Florida. The NPS has contracted with Parsons, a qualified consultant, to assist with the preparation of the EA. This notice begins the EA process by requesting your comments on the scope of the analysis that will be conducted.

Two Public Scoping Workshops will be held on February 10, 2003:

Ernest Coe Visitor Center
Everglades National Park
Time: 2:30 to 4:30 PM

Florida City Council Chambers
404 West Palm Drive, Florida City
Time: 5 - 7 PM

The public is welcome to attend at any time during the two-hour workshops. No presentations are scheduled. The meeting format is intended to promote informal interaction with staff, exhibits and opportunities to make written and verbal comments.

BACKGROUND

The Pine Island and Headquarters area is at the main entrance to Everglades National Park and receives over 190,000 visitors annually (see location map, Figure 1). The area includes the main visitor center and bookstore, park offices, a maintenance and storage area, a recycling center, and employee housing. Wastewater from these developed areas is currently treated by 26 individual septic systems. The area is surrounded by freshwater wetlands and uplands, including Taylor Slough, marl prairie, cypress domes, and rocky pinelands (Fig. 2,3). Taylor Slough, a near-pristine watershed, flows south and east for 18 miles, eventually draining into Florida Bay. These surrounding ecosystems are environmentally sensitive. Freshwater Everglades ecosystems are naturally low in nutrients such as phosphorus and nitrogen that are found in wastewater. Given the location, effluent discharge has the potential to directly impact the surrounding fragile environment.

Figure 1. Location map. Project location is indication by arrow.

Figure 2. Everglades headquarters area (top middle, borrow pit; left, office buildings; middle, visitor center; right, borrow pit; bottom, parking lots and access roads); sawgrass marsh in background.

PURPOSE AND NEED

The proposed project involves replacing the 26 existing individual septic systems with a new 25,000 gallons-per-day (gpd) wastewater treatment plant (WWTP) and associated collection/disposal systems in accordance with pertinent Florida Department of Environmental Protection (FDEP) regulations. The existing systems, installed 35 years ago, does not meet current State of Florida standards for new septic tank construction. With the high water table in the local area, the system is inadequate to properly treat wastewater. Additionally, over time, the headquarters area has increased in size so that higher loads are being delivered to the septic systems.

The existing septic systems provide little treatment for nutrients such as nitrogen and phosphorous. Nutrients are known to adversely impact water quality throughout the freshwater Everglades ecosystem. Testing of groundwater in the vicinity has indicated a background phosphorus level of 0.08 mg/l. Phosphorus levels significantly higher than this would allow the establishment of non-native plant species. Continued discharge will eventually degrade receiving groundwater quality and natural ecosystems.

Although there is no regulatory requirement to improve upon the existing septic systems presently in use in the project area, the park has chosen to accomplish this work in an effort to ensure sound stewardship of the surrounding ecosystem.

PRELIMINARY ALTERNATIVES

The NPS is considering 2 preliminary alternatives for the treatment and disposal of Pine Island and Headquarters wastewater.

1. No Action
2. Construction of a new WWTP.

The alternatives are described below and compared in Table 1.

Alternative 1: No Action

In conformance with National Environmental Policy Act (NEPA) standards, a “No Action” alternative is included. No Action implies the existing disposal methods would be continued.

Alternative 2: Construction of a new WWTP.

This alternative consists of construction of a new 25,000 gpd WWTP adjacent to the recycling center; construction of two percolation ponds on the abandoned Pine Island airstrip (Figures 3 and 4), through which treated effluent would be discharged; and installation of wastewater system collection piping.

The new plant would treat effluent to comply with the year 2010 FDEP standards, and would reduce nutrients (total nitrogen and phosphorous) to meet treatment and discharge requirements.

Figure 3. Pine Island airstrip, with exotic vegetation on both sides.

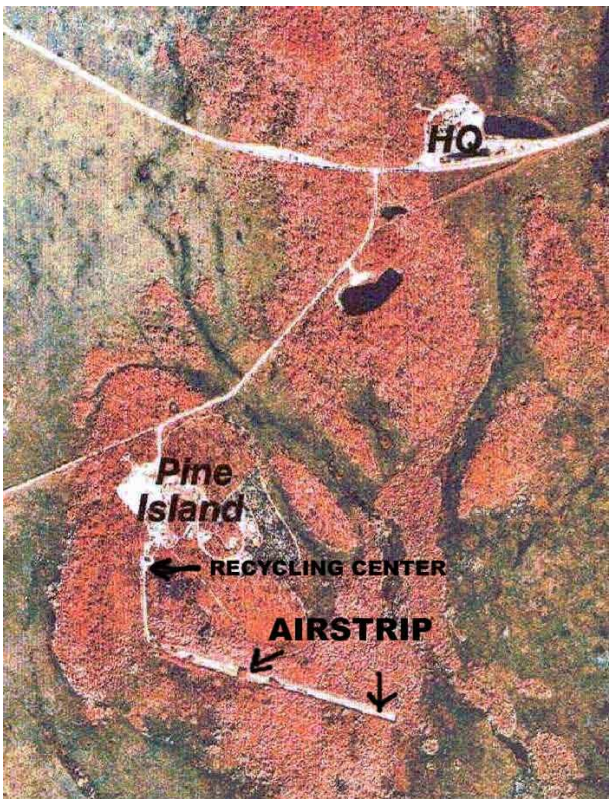

Figure 4. Infrared photo of project area showing headquarters and the visitor center (HQ), the Pine Island developed area, the recycling center, and the airstrip. Red areas indicate pinelands.

Preliminary Resource Considerations

Preliminary consultations identified the following issues and concerns about the project. The NPS is collecting limited baseline data to help evaluate effects on some of the most important resource concerns. The resource considerations identified to date include:

- Water Quality and Hydrology
- Wildlife and Protected Species
- Wetlands and Floodplains
- Human Health and Safety
- Vegetation
- Visitor Experience

If public or agency concerns arise, additional resources may be evaluated.

TABLE 1. Flamingo wastewater system comparison of alternatives.

ELEMENT	Alternative 1. No action (current).	Alternative 2. Build a WWTP.
Collection System	Individual (separate) systems in PI/HQ area.	Collection system would be centralized.
Disinfection	No effluent disinfection.	Effluent would be disinfected in accordance with FDEP requirements.
Discharge	26 drainfields in PI/HQ area.	Two alternating percolation ponds.
Effluent water quality	No nutrient removal. Limited removal of biological oxygen demand (BOD) and total suspended solids (TSS).	Nutrient (nitrogen and phosphorus) removal. BOD and TSS removal would meet or exceed FDEP requirements.
Operation	Little to no maintenance.	Would require licensed operators.
Monitoring/reporting	No monitoring or reporting.	Would be monitored and reported regularly in accordance with state-issued operating permit.

Public Participation

There will be opportunities for the public to be informed about and participate in the EA process. Figure 5 describes the timeline for this project.

The pre-addressed comment form accompanying this scoping notice can be used to submit written comments. Comments will be accepted for a 30-day scoping period from January 26 to February 25, 2003. To be considered, comments must be received at the park in writing by the close of this period.

Once the draft EA has been completed, the document will be released to the public to review for a period of 45 days, during which another public workshop will be scheduled. Written comments on the draft EA will be accepted during this period.

The NPS will maintain a mailing list throughout the process. Informational materials will be distributed during the process to those on the mailing list. In addition, anyone interested in being added to the mailing list should reply via the enclosed comment form or contact the NPS at the address listed.

For more information, visit our web page at:
http://www.nps.gov/ever/planning

Please address comments or questions to:

National Park Service
Everglades National Park
Attn: Elsa Alvear, Environmental Specialist
40001 S.R. 9336
Homestead, FL 33034

e-mail: Elsa_Alvear@nps.gov

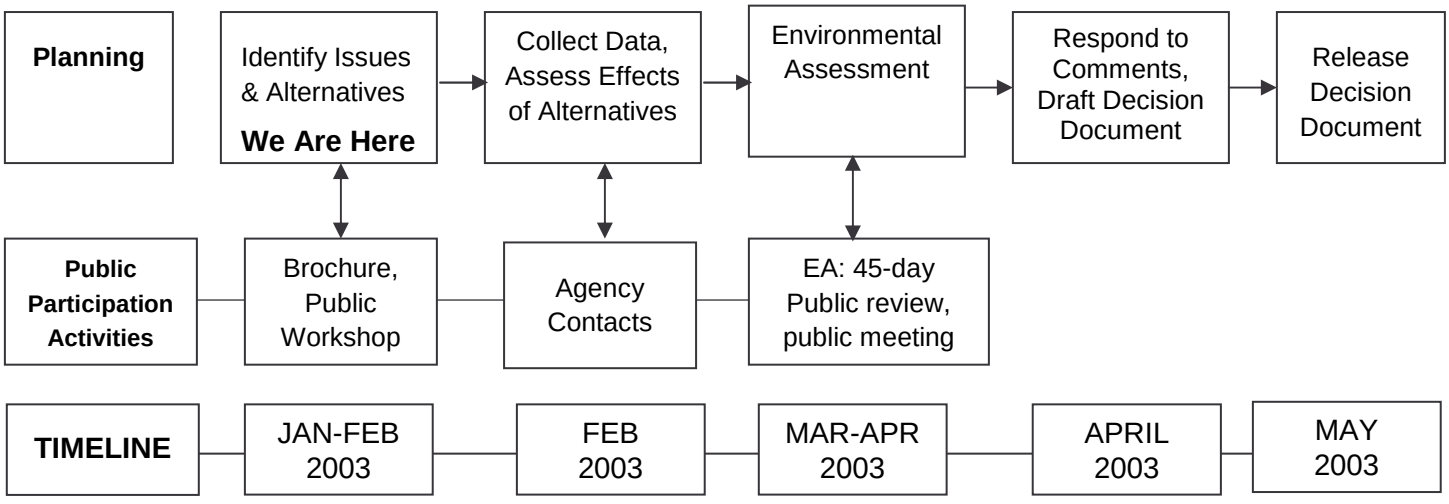

Figure 5. EA Process and Timeline

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

REPLY REFER TO:

L7615

FEB 10 2003

Mr. Don Klima
Advisory Council on Historic Preservation
Old Post Office Building
1100 Pennsylvania Avenue, NW, Suite 809
Washington, DC 20004

Subject: Section 106 Consultation, Pine Island and Headquarters Wastewater System Improvements at Everglades National Park

Dear Mr. Klima:

The National Park Service (NPS) has initiated planning to upgrade the Pine Island and Headquarters wastewater system, located within Everglades National Park, Miami-Dade County, Florida. The project area is described and shown on the attached scoping brochure and maps. The goal of this project is to provide safe, reliable wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. Implementation of the project is expected to occur in the summer and fall of 2003.

Although we are just in the scoping stage for this project, we believe that its eventual implementation may have the potential to affect properties that may be eligible for inclusion in the National Register of Historic Places. Therefore, we are initiating consultation with your office in accordance with 36 CFR 800 and with the 1995 Servicewide Programmatic Agreement among your office, the National Conference of State Historic Preservation Officers, and the National Park Service.

This letter also is to notify your office that we plan to use the environmental assessment process to accomplish compliance for both Section 106, in accordance with the National Historic Preservation Act, as amended, and the National Environmental Policy Act (as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

As soon as the environmental assessment is completed, we will send it to you for your review, comment and concurrence that the Section 106 process has been completed.

Additional supporting data, including results of archeological inventories and National Register nomination forms, as appropriate, will be included with the EA transmittal to your office.

We look forward to your participation in the planning process. We believe that it will result in better planning for cultural resources management, and will help ensure that cultural resources are adequately considered during the preparation of the project compliance documents.

Should you have any questions or desire additional information, please contact Brien Culhane, Chief, Planning and Compliance at Everglades National Park, by calling 305-242-7717 or by email at brien_culhane@nps.gov. As required by 36 CFR 800, the State Historic Preservation Office has been notified regarding inclusion of Section 106 compliance within the environmental assessment process.

Sincerely,

Maureen Finnerty
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

REPLY REFER TO:

L7615

FEB 10 2003

Ms. Janet Snyder Matthews
State Historic Preservation Officer
Division of Historical Resources - Bureau of Historic Preservation
Compliance and Review Section
R.A. Gray Building
500 S. Bronough Street
Tallahassee, FL 32399-0250

Subject: Section 106 Consultation, Pine Island and Headquarters Wastewater System Improvements at Everglades National Park

Dear Ms. Matthews:

The National Park Service (NPS) has initiated planning to upgrade the Pine Island and Headquarters wastewater system, located within Everglades National Park, Miami-Dade County, Florida. The project area is described and shown on the attached scoping brochure and maps. The goal of this project is to provide safe, reliable wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. Implementation of the project is expected to occur in the summer and fall of 2003.

Although we are just in the scoping stage for this project, we believe that its eventual implementation may have the potential to affect properties that may be eligible for inclusion in the National Register of Historic Places. Therefore, we are initiating consultation with your office in accordance with 36 CFR 800 and with the 1995 Servicewide Programmatic Agreement among your office, the Advisory Council on Historic Preservation, and the National Park Service.

This letter also is to notify your office that we plan to use the environmental assessment process to accomplish compliance for both Section 106, in accordance with the National Historic Preservation Act, as amended, and the National Environmental Policy Act (as described in 36 CFR 800.8 (a-c)), and to analyze potential effects from proposed implementation of this plan.

As soon as the environmental assessment is completed, we will send it to you for your review, comment and concurrence that the Section 106 process has been completed. Additional supporting data, including results of archeological inventories and National Register nomination forms, as appropriate, will be included with the EA transmittal to your office.

We look forward to your participation in the planning process. We believe that it will result in better planning for cultural resources management, and will help ensure that cultural resources are adequately considered during the preparation of the project compliance documents.

Should you have any questions or desire additional information, please contact Brien Culhane, Chief, Planning and Compliance at Everglades National Park, by calling 305-242-7717 or by email at brien_culhane@nps.gov. As required by 36 CFR 800, the Advisory Council on Historic Preservation has been notified regarding inclusion of Section 106 compliance within the environmental assessment process.

Sincerely,

Maureen Finnerty
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

January 28, 2003

Mr. Jay Slack
Field Supervisor, South Florida Field Office
U.S. Fish and Wildlife Service
1339-20th Street
Vero Beach, FL 32960

Dear Mr. Slack:

The National Park Service (NPS) is preparing an environmental assessment (EA) to address options for improving the Pine Island and Headquarters wastewater system, located within Everglades National Park, Miami-Dade County, Florida. Enclosed is a brochure that describes the background of, and options for, this proposal. Below is a table of the federally listed endangered, threatened, and candidate species that our data suggest have the potential to occur in the project area.

To ensure that the park's planning effort adequately evaluates the potential effect that project implementation would have on threatened and endangered species, we would appreciate your review of the enclosed list.

In keeping with the requirements of Section 7 consultation and NPS policy, as soon as the environmental assessment is complete we will send you a copy with an official transmittal letter for your review and comment. In addition, The U.S. Fish and Wildlife Service is invited to participate in two public scoping workshops that will be held for this project on February 10, 2003:

Ernest Coe Visitor Center Everglades National Park 2:30 p.m. to 4:30 p.m.	Florida City Council Chambers 404 West Palm Drive, Florida City 5 p.m. to 7 p.m.

The format will include a display on the project, with park staff available to answer questions and take comments. No presentations are planned. The purpose of the workshops is to identify issues and concerns in order to define the scope of analysis for the environmental assessment.

We look forward to working cooperatively with you on the planning and implementation of this project. If you have any questions or desire more information, please contact Elsa Alvear at (305) 242-7703 or at Elsa_Alvear@nps.gov.

Thank you for your time and interest in this important project.

Sincerely,

For
Maureen Finnerty
Superintendent

Enclosure

Federally listed species with potential to occur in the project area.

Common name	Species name	Federal status
ANIMALS		
Eastern indigo snake	*Drymarchon corais couperi*	Threatened
Bald eagle	*Halieetus leucocephalus*	Threatened
Wood stork	*Mycteria americana*	Endangered
Florida panther	*Felis concolor coryi*	Endangered
PLANTS		
Blodgett's silverbrush	*Argythamnia blodgettii*	Candidate
Deltoid spurge	*Chamaesyce deltoidea deltoidea*	Endangered
Pineland sandmat	*Chamaesyce deltoidea pinetorum*	Candidate
Garber's spurge	*Chamaesyce garberi*	Threatened
Florida pineland crabgrass	*Digitaria pauciflora*	Candidate

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

January 28, 2003

Ms. Cindy Cranick
Florida State Clearinghouse Coordinator
Florida Department of Environmental Protection
3900 Commonwealth Blvd., Mail Station 47
Tallahassee, FL 32399-3300

Dear Ms. Cranick:

Subject: **Advance Notification**
Pine Island and Headquarters Wastewater Treatment System Improvements and Environmental Assessment
Everglades National Park
Miami-Dade County

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. The enclosed Scoping Notice is forwarded to your office for processing through appropriate State agencies.

Although more specific comments will be solicited during the public review period for the draft environmental assessment, we request that permitting and permit reviewing agencies review the attached information and furnish us with whatever general comments they consider pertinent at this time. In addition, please provide a consistency review for this project in accordance with the State's Coastal Zone Management Program and the approved Comprehensive Plan of the local government jurisdictions.

We are looking forward to receiving your comments on the project within 30 days. Should additional review time be required, a written request for an extension of time must be submitted to our office within the initial 30-day comment period.

Your comments should be addressed to:

Ms. Elsa Alvear
Environmental Compliance Specialist
Everglades National Park
40001 State Road 9336
Homestead, Florida 33034-6733

Your expeditious handling of this notice will be appreciated. To help facilitate review of this project, distribution of this notice is being made to the state and county agencies listed below.

Thank you very much for your assistance. Should you have any questions about the project, please contact Elsa Alvear, Environmental Protection Specialist, by calling 305-242-7703, or by email at Elsa_Alvear@nps.gov.

Sincerely,

Brien Culhane
Chief, Planning and Compliance

Enclosure

cc:
Florida Department of Agriculture and Consumer Services – Mr. W. Ray Scott
Florida Department of Community Affairs – Mr. Henry E. Timmerman, Director, Division of Community Planning
Florida Department of Environmental Protection –
Mr. Ernest Barnett, Director of Environmental Planning and Compliance,
Ms. Jayne Bergstrom, Environmental Manager, Southeast District,
Ms. Kris McFadden, Environmental Resources, Southeast District
Florida Fish and Wildlife Conservation Commission – Mr. Mark Robson, Regional Director
Florida Department of Health - Dr. John O. Agwunobi, Secretary
Florida Department of State - Dr. Janet Snyder Matthews, State Historic Preservation Officer, Bureau of Historic Preservation
Florida Department of Transportation
Ms. Donna Pope
Ms. Marjorie Bixby, District 6 Environmental Administrator
Office of the Governor - Mr. Richard Smith, Senior Government Analyst
South Florida Water Management District –
Mr. Henry Dean, Executive Director
Ms. Kathy Copeland, Senior Policy Advisor
Mr. Julio Fanjul, Water Resources Advisory Committee
South Florida Regional Planning Council – Ms. Carolyn A. Deckle, Executive Director
Broward County - Mr. Steve Somerville, Director, Department of Natural Resources
Miami-Dade County –
Mr. Roman Gatesi, Jr., Water Resources Manager, Office of the County Manager
Mr. John Renfrow, Director, Dept. of Environmental Resource Management
Mr. Roman Wenglowsky, Water and Sewer Department
Monroe County –
Ms. Marlene Conway, Director, Planning and Environmental Resources Department
Mr. George Garrett, Director, Marine Resources Department
Palm Beach County – Mr. Kenneth S. Todd, Water Resources Manager

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

February 5, 2003

Ms. Jayne Bergstrom
Environmental Manager
FDEP S.E. District
400 N. Congress Avenue, Suite 200
West Palm Beach, FL 33401

Dear Ms. Bergstrom:

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. The goal of this project is to provide quality wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. A brochure describing this project is enclosed for your information.

We would like to invite your participation in helping to develop the best project possible. We would appreciate your careful review of the brochure and ask that you provide us with comments by February 25, 2003. Respond by email to Elsa_Alvear@nps.gov, or use the comment form included in the brochure.

In addition, two public scoping workshops will be held on February 10, 2003:

Ernest Coe Visitor Center Everglades National Park 2:30 p.m. to 4:30 p.m.	Florida City Council Chambers 404 West Palm Drive, Florida City 5 p.m. to 7 p.m.

The public is welcome to attend at any time during the informal workshops. The format will include a display on the project, with park staff available to answer questions and take comments. No presentations are planned. The purpose of the workshops is to identify issues and concerns in order to define the scope of analysis for the environmental assessment.

As soon as the draft environmental assessment is complete, the document will be released to the public to review for a period of 45 days, during which time another public workshop will be scheduled. We will also post it on our website at http://www.nps.gov/ever/planning. Written comments on the draft EA will be accepted during the 45-day review period.

We look forward to your participation in the planning process. Should you have any questions about the project or the workshops, please contact Elsa Alvear, Environmental Protection Specialist, by calling 305-242-7703, or by email at Elsa_Alvear@nps.gov.

Thank you for your time and interest in this important project.

Sincerely,

Maureen Finnerty
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

Chairman Billy Cypress
Miccosukee Tribe of Indians of Florida
P.O. Box 440021
Tamiami Station
Miami, FL 33144

Dear Mr. Cypress:

This letter is to inquire whether your tribe desires to undertake government-to-government consultation in conjunction with a proposed environmental assessment.

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. The goal of this project is to provide quality wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. A brochure describing this project is enclosed for your information.

In addition to government-to-government consultation, the Miccosukee Tribe of Indians of Florida is invited to participate in two public scoping workshops that will be held on February 10, 2003:

Ernest Coe Visitor Center	Florida City Council Chambers
Everglades National Park	404 West Palm Drive, Florida City
2:30 p.m. to 4:30 p.m.	5 p.m. to 7 p.m.

Please contact me at your earliest convenience if you wish to undertake government-to-government consultation concerning the Pine Island and Headquarters Wastewater System Improvements. Even if you do not wish to engage in formal consultation, I would welcome any thoughts and recommendations you might have about this project.

Sincerely,

Maureen Finnerty
Superintendent

Enclosure

Cc: Dionè C. Carroll, Esq.

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

Mitchell Cypress, President
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Mr. Cypress:

This letter is to inquire whether your tribe desires to undertake government-to-government consultation in conjunction with a proposed environmental assessment.

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. The goal of this project is to provide quality wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. A brochure describing this project is enclosed for your information.

In addition to government-to-government consultation, the Seminole Tribe of Florida is invited to participate in two public scoping workshops that will be held on February 10, 2003:

Ernest Coe Visitor Center	Florida City Council Chambers
Everglades National Park	404 West Palm Drive, Florida City
2:30 p.m. to 4:30 p.m.	5 p.m. to 7 p.m.

Please contact me at your earliest convenience if you wish to undertake government-to-government consultation concerning the Pine Island and Headquarters Wastewater System Improvements. Even if you do not wish to engage in formal consultation, I would welcome any thoughts and recommendations you might have about this project.

Sincerely,

Maureen Finnerty

Maureen Finnerty
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

Kenneth Chambers, Principal Chief
Seminole Nation of Oklahoma
5th and Brown Streets
Wewoka, Oklahoma 74884

Dear Mr. Chambers:

This letter is to inquire whether your tribe desires to undertake government-to-government consultation in conjunction with a proposed environmental assessment.

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. The goal of this project is to provide quality wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. A brochure describing this project is enclosed for your information.

In addition to government-to-government consultation, the Seminole Nation of Oklahoma is invited to participate in two public scoping workshops that will be held on February 10, 2003:

Ernest Coe Visitor Center	Florida City Council Chambers
Everglades National Park	404 West Palm Drive, Florida City
2:30 p.m. to 4:30 p.m.	5 p.m. to 7 p.m.

Please contact me at your earliest convenience if you wish to undertake government-to-government consultation concerning the Pine Island and Headquarters Wastewater System Improvements. Even if you do not wish to engage in formal consultation, I would welcome any thoughts and recommendations you might have about this project.

Sincerely,

Maureen Finnerty
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

Ms. Virginia Poole
William McKinley Osceola Camp
HC 61 Box 23-B
Ochopee, FL 34141

Dear Ms. Poole:

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. The goal of this project is to provide quality wastewater services for park visitors and employees in an environmentally sound manner. The NPS will comply with the National Environmental Policy Act by preparing an environmental assessment for this project. A brochure describing this project is enclosed for your information.

Given your special association with Everglades National Park, I would welcome any thoughts and recommendations you might have about this project. In addition, I would like to invite your participation in two public scoping workshops that will be held on February 10, 2003:

Ernest Coe Visitor Center	Florida City Council Chambers
Everglades National Park	404 West Palm Drive, Florida City
2:30 p.m. to 4:30 p.m.	5 p.m. to 7 p.m.

The workshop format will include a display on the project, with park staff available to answer questions and take comments. No presentations are planned. The purpose of the workshops is to identify issues and concerns in order to define the scope of analysis for the environmental assessment.

As soon as the draft environmental assessment is complete, the document will be released to the public to review for a period of 45 days, during which time another public workshop will be scheduled. We will also post it on our website at http://www.nps.gov/ever/planning. Written comments on the draft EA will be accepted during the 45-day review period.

Should you have any questions or need additional information about the project or the workshops, please contact Sandy Dayhoff at 239-695-4796.

Thank you for your time and interest in this important project.

Sincerely,

Maureen Finnerty
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

Ms. Beth Carlson
Lewis, Longman, and Walker
1700 Palm Beach Lakes Boulevard
Suite 1100
West Palm Beach, Florida 33401

Dear Ms. Carlson: Beth

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. On January 27, 2003, I sent a letter to Mitchell Cypress, President, Seminole Tribe of Florida, inquiring about government-to-government consultation concerning this plan.

The purpose of this correspondence is to provide some background information about this project and forward a courtesy copy of my letter to Mr. Cypress for your records. In sending these documents, I intend no deviation from government-to-government protocol, but provide them as potentially useful information for your office.

Sincerely,

Maureen Finnerty

Maureen Finnerty
Superintendent

Enclosures:
Pine Island and Headquarters Wastewater System Improvements Scoping Brochure
Letter to Tribal Leader

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

Mr. Fred Dayhoff, Tribal Representative
Miccosukee Tribe of Indians of Florida
Tamiami Station
P.O. Box 440021
Miami, FL 33144

Dear Mr. Dayhoff:

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. On January 27, 2003, I sent a letter to Billy Cypress, Chairman, Miccosukee Tribe of Indians of Florida, inquiring about government-to-government consultation concerning this plan.

The purpose of this correspondence is to provide some background information about this project and forward a courtesy copy of my letter to Mr. Cypress for your records. In sending these documents, I intend no deviation from government-to-government protocol, but provide them as potentially useful information for your office.

Sincerely,

Maureen Finnerty
Superintendent

Enclosures:
Pine Island and Headquarters Wastewater System Improvements Scoping Brochure
Letter to Tribal Leader

United States Department of the Interior

NATIONAL PARK SERVICE
Everglades National Park
and
Dry Tortugas National Park
40001 State Road 9336
Homestead, Florida 33034-6733

IN REPLY REFER TO:
L7615

Mr. Dexter Lehtinen
Lehtinen, Vargas, Reiner, and Riedi
7700 N. Kendall Drive
Miami, FL 33156

Dear Mr. Lehtinen:

The National Park Service (NPS) has begun planning to improve the wastewater treatment system for the Pine Island and Headquarters developed area within Everglades National Park. On January 27, 2003, I sent a letter to Billy Cypress, Chairman, Miccosukee Tribe of Indians of Florida, inquiring about government-to-government consultation concerning this plan.

The purpose of this correspondence is to provide some background information about this project and forward a courtesy copy of my letter to Mr. Cypress for your records. In sending these documents, I intend no deviation from government-to-government protocol, but provide them as potentially useful information for your office.

Sincerely,

Maureen Finnerty
Superintendent

Enclosures:
Pine Island and Headquarters Wastewater System Improvements Scoping Brochure
Letter to Tribal Leader

SEMINOLE TRIBE OF FLORIDA

TELEPHONE
(954) 966-6300

FAX
(954) 967-3484

WEBSITE:
www.seminoletribe.com

6300 STIRLING ROAD
HOLLYWOOD, FLORIDA 33024

February 12, 2003

Ms. Maureen Finnerty, Superintendent
National Park Service
Everglades National Park
And Dry Tortugas National Park
40061 State Road 9336
Homestead, Florida 33034-6733

RE: SEMINOLE TRIBE OF FLORIDA CONSULTATION ROLE FOR THE EVERGLADES NATIONAL PARK WASTEWATER TREATMENT SYSTEM ENVIRONMENTAL ASSESSMENT

Dear Ms. Finnerty:

Thank you for inviting the Seminole Tribe of Florida to participate in government-to-government consultation with the National Park Service regarding Everglades National Wastewater environmental assessment. As the Tribe currently has no interests that may be impacted by this effort, there is no need to pursue consultation on this project.

I appreciate your continued adherence to the procedure for requesting government-to-government consultation with the Tribe on issues which may affect our varied interests, and look forward to working with you in the future.

SEMINOLE TRIBE OF FLORIDA

Sincerely,

Mitchell Cypress,
Vice-Chairman

MC/cac

cc: Jim Shore, General Counsel
Roslynn Ferguson, Lewis, Longman & Walker, P.A.

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APPENDIX B

PINE ISLAND VALUE ANALYSIS

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PMA Consultants LLC

Value Analysis/Choosing by Advantages

HEADQUARTERS AND PINE ISLAND WASTEWATER TREATMENT PLANT

EVERGLADES NATIONAL PARK

Value Analysis/Choosing By Advantages Study Summary

Project Description: Headquarters and Pine Island Wastewater Treatment Plant

Date: May 7 - 9, 2002

Richard L. Johnson, P.E. Date

PMA Consultants LLC

VALUE ANALYSIS/CHOOSING BY ADVANTAGES STUDY

For

HEADQUARTERS AND PINE ISLAND WASTEWATER TREATMENT PLANT AT EVERGLADES NATIONAL PARK

PREPARED FOR:

National Park Service

PREPARED BY:

PMA Consultants LLC and CDM
In association with National Park Service

DRAFT

Workshop: May 7 - 9, 2002
Submitted: May 20, 2002

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Introduction

The National Park Service (NPS) intends to replace and upgrade the wastewater treatment facilities at the Pine Island/Headquarters area of Everglades National Park (EVER). The National Park Service completed a Development Concept Plan (DCP) that provides an analysis of various treatment options that were investigated by the Denver Service Center (DSC). A Design Analysis, Package 191C Report, dated January 2001, was prepared and discusses design criteria, treatment options, and anticipated costs. The Everglades National Park received direction to proceed with a Value Analysis/Choosing-by-Advantages (VA/CBA) for the location of either a single central treatment plant or two or more smaller plants. This VA/CBA evaluates/explores the various alternatives for wastewater treatment and disposal and provides direction for selection of Best Available Technology (BAT), for present and future regulations.

Background

Pine Island wastewater is presently treated with conventional septic tanks and leach fields. Most of those systems were installed at least 35 years ago and were constructed in compliance with the design requirements enforced by the State of Florida at that time. Present systems are inadequate to properly treat the wastewater being generated by these systems. The Headquarters has dramatically increased in size since its original construction.

Current State of Florida design parameters require that the bottom elevation of septage leach fields be a minimum 24 inches above the high groundwater elevation. This requirement is not satisfied at the existing facilities. Therefore, leachate is discharged to the groundwater with insufficient treatment due to less than adequate separation and the nature of the subsurface soil conditions.

These issues increase the concern that the continued discharge of increased quantities of septic system effluent to the local groundwater of Pine Island will eventually degrade the receiving groundwater quality and the surrounding ecosystems. This potential degradation over time may lead to negative effects on natural systems and potable water well supply sources. As of the date of this study, sampling of groundwater wells in the Headquarters area of Pine Island has not shown any indication of groundwater quality degradation.

Purpose

The purpose of the VA/CBA study was to evaluate potential sites, select one or several sites for new wastewater treatment facilities, and to identify treatment options. Also considered was whether to construct a new facility or to collect and pump the Pine Island wastewater to an offsite existing treatment facility with excess capacity.

A Value Analysis/Choosing by Advantages work session was conducted at the Everglades National Park Headquarters in Florida City, FL. The VA/CBA study consisted of a three-day session from May 7, 2002 through May 9, 2002. The first day was spent familiarizing the

VA/CBA Team with the existing facilities and proposed alternatives, ENP issues and facilities limitations and constraints. During the afternoon of the first day the team identified the project stakeholders and their needs and wants. The day concluded with the team discussing and agreeing on the factors with which to evaluate the proposed project.

The second day began with a site tour to physically investigate three potential sites that had been identified within the Park for a combined wastewater treatment facility. One site was the Recycling Facility, the second site is the abandoned airstrip and the third was the Boneyard borrow pit. The rest of the morning was used to identify project alternatives and their relative advantages and disadvantages. In the afternoon the team discussed the attributes and identified the advantages of each alternative, and evaluated the alternatives using the CBA methodology. The third day was used to prepare the cost estimates and to develop the alternatives so that they could be compared on a cost per point basis.

This VA/CBA evaluated the DSC proposed design alternatives and new alternatives that were derived from VA/CBA Team discussions and deliberations. The evaluation resulted in the selection of a preferred alternative. The preferred alternative and VA team recommendations should be further developed during Design Development.

Evaluation and Development

The site and treatment alternatives were reviewed to determine, which had the greatest potential for meeting the necessary requirements for the collection, treatment and disposal of the wastewater generated within the Everglades National Park.

Three site locations within the ENP were chosen for investigation. Two other alternatives proposed either an offsite location for effluent disposal or the transmission of raw sewage to the Florida City collection system for treatment and disposal. A matrix was designed to evaluate the possible treatment alternatives. The following factors were used as the basis of the analysis:

- Prevent Loss of Resources
- Maintain and Improve Condition of Resources
- Protect Public Health, Safety and Welfare
- Improve Operational Efficiency and Sustainability
- Protect Employee Health, Safety and Welfare
- Provide Other Advantages to the National Park System
- Construct an Environmentally Responsible Project
- Be Consistent with South Florida Water Quality Restoration Goals

Each of the treatment alternative advantages were rated according to the factors listed above. Each advantage for each alternative was assigned a numerical score for each factor that the VA team believed best represented the relative value of that alternative. All value scores for each advantage were totaled to arrive at a numerical ranking for each of the six alternatives.

The final scores for each wastewater treatment alternative at the Everglades National Park Headquarters and Pine Island were:

DESCRIPTION	CONSTRUCTION COSTS	ADVANTAGE POINTS	TOTAL NET PRESENT WORTH ($/POINT)
Construct individual mounds	$1,481,250	235	$7,671
Construct separate treatment plants one effluent location	$5,837,500	440	$17,011
Construct combined plant for HQ and Pine Island	$2,237,500	590	$6,439
Pump Sewage to the Florida City System	$4,200,000	600	$7,666
Do Nothing Use “As-Is”		130	
Enter an Inter-agency Agreement (IAA) for Offsite Land (Facility and disposal)	$3,175,001	520	$9,113

These scores represent the consensus of all the VA Team members of the relative advantage of each alternative compared to the others. Please refer to the CBA worksheet in Phase IV, pages 26 through 29 for a complete description of the analysis, including all factors, sub-factors, attributes and advantages.

In the final analysis, the construction of a single treatment plant at Everglades National Park scored the lowest cost per advantage point ($6,432) and had the median construction cost ($3,386,000). The next lowest cost per advantage point ($7,666) is to pump sewage to the Florida City system, but this alternative has the highest construction cost ($4,200,000) and requires interaction and negotiation with Florida City. It also requires that the Park Service surrender control over the final effluent water quality and reclamation method.

Sensitivity Analysis

An analysis was performed on the final costs and scores for each alternative. Each alternative was sorted based on its total present worth life cycle costs. These costs were plotted on the X-axis against the total advantage point score on the Y-axis. By arranging the data in this format the slope of the line between advantages gives a relative indication of the increased benefit against the resulting increasing cost. The resulting graph that is included as Figure 1 demonstrates the large increase in benefits resulting from choosing Alternative 3 in lieu of Alternative 1. Similarly, the graph demonstrates a minimal increase in benefit resulting from choosing Alternative 4 and a decrease in the benefits resulting from choosing Alternatives 6 or 2.

Based on this graph, it is demonstrated that the slope or advantage point per dollar is gained from Alternative 3. It would take a significant change in the advantage point scores to alter this result. Therefore, in our opinion, Alternative 3 (Construct Combined Plant for HQ and Pine Island) has is correctly ranked as the preferred alterative.

Recommendation

It is the EVER 191C VA/CBA team's recommendation that the NPS proceed with the development of a combined wastewater treatment plant to treat the wastewater from both Headquarters and Pine Island. This alternative consists of a treatment facility at the Boneyard/Borrow Pit with a percolation/evaporation pond at the same site. This alternative assumes that the existing borrow pit can be filled with the soil removed from the Hole-in-the-donut. Another permeation of this alternative is to build the treatment plant at the Recycle Facility area and construct ponds at the abandoned airstrip.

VALUE ANALYSIS/CHOOSING BY ADVANTAGES METHODOLOGY

General

This section describes the value analysis procedure used during the Value Analysis/Choosing by Advantages (VA/CBA) study. It is followed by separate narratives and conclusions concerning:

- Value Analysis Workshop Participants
- As-Proposed Project Description
- Available Study Information
- Economic Data
- Cost Model
- Function Analysis, including F.A.S.T. Diagram
- Creative Idea Listing and Judgement of Ideas

A systematic approach was used in the VA/CBA study and the key procedures involved were organized into three distinct parts: 1) preparation, 2) workshop and 3) post-study.

Preparation Effort

Pre-study preparation for the VA/CBA effort consisted of scheduling study participants and tasks; gathering necessary background information on the project and compiling Project data into a cost model. Information relating to the design, construction, and operation of the facility was important as it formed the basis of comparison for the study effort. Information relating to funding, project planning operating needs, systems evaluations, basis of cost, soil conditions, and construction of the facility was also a part of the analysis preparation effort.

Value Analysis Workshop Effort

The workshop was a three-day effort. During the workshop, the job plan was followed. The job plan guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It includes five phases:

- Information Gathering Phase,
- Creativity Phase
- Evaluation Phase
- Development Phase
- Recommendations, Presentation, Reporting Phase

1. Information Gathering Phase

At the beginning of the study, the conditions and decision that have influenced the development of the project must be reviewed and understood. For this reason, the National Park Service presented information about the project to the VA/CBA team on the first day of the session. The project stakeholders were identified and listed with associated Primary Interests (needs) and Secondary Interests (wants). National Park Service evaluation factors for the project were discussed and agreed upon by the VA Team.

On the second day of the study, the team conducted a field trip to inspect the potential sites for the project. Based on a report prepared by the Denver Service Center, cost models were developed for this project by major construction and logistic elements. They were used as baseline costs for the first three alternatives of the project and served as a basis for alternative functional categorization.

2. Function Analysis Phase

The VA/CBA team identified the functions of the various Project elements and subsystems and a Functional Analysis System Technique (F.A.S.T.) Diagram was created to display the relationships of the functions.

3. Creativity Phase

This study phase involved the creation and listing of ideas. Creative idea worksheets were organized according to project elements and components. During this phase, the team developed as many ideas as possible to provide the necessary functions with the project at a lower cost to the owner, for ease of construction, improved safety, and National Park Service functionality. Judging of the ideas was restricted at this point. The VA/CBA team was looking for a large variety of ideas.

4. Evaluation Phase

During this phase of the workshop, the VA/CBA team judged the ideas generated during the creative phase. Advantages of each idea were discussed and a matrix developed to determine the highest-ranking ideas. Ideas found to be irrelevant or not worthy of additional study were discarded. Those that represented the greatest potential for cost savings or improvement to the project were “carried forward” for further development.

5. Development Phase

During the development phase, each highly rated idea was expanded into a workable solution. The development consisted of a description of the alternative, life cycle cost comparisons, where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed alternatives.

6. Recommendation, Post Workshop Effort/Presentation, Reporting Phase

The post-study portion of the VA/CBA study included the preparation of a draft Value Analysis/Choosing By Advantages Study Report. The National Park Service will move forward with this project by submitting the Value Analysis/Choosing By Advantages Report and Project Report to the Development Advisory Board (DAB) for review and approval. Once DAB approval is received, the NPS will proceed with design and construction of the new facility planned for fiscal year 2003.

VA TEAM MEMBERS

EVERGLADES NATIONAL PARK
HEADQUARTERS AND PINE ISLAND
WASTEWATER TREATMENT PLANT

NAME	AFFILIATION	PHONE
Rick Johnson, P.E./ Team Leader/Facilitator	PMA Consultants LLC	407/351-7016
John Gopaul, P.E./Civil Engineer,	NPS-SERO	404/562-3124
Tom Murphy, Project Manager,	NPS-DSC	303/969-2438
Steve Bainbridge, Civil Engineer,	NPS-DSC	303/969-2291
Mike Jester, Facility Manager,	EVER	305/242-7771
Mike Savage, Civil Engineer,	EVER	305/242-7776
Elsa Alvear, Compliance	EVER	305/242-7703
Jonathan Taylor, Supervisory Botanist	EVER –	305/242-7893
Marcy Quinn, Maintenance	EVER	239/695-1500
Rod Reardon, P.E. Environmental Engineer	CDM	407/660-2552
Andrew Lynn, P.E. Project Design Leader	CDM	305/372-7171

INFORMATION PHASE

GOALS AND OBJECTIVES

The National Park Service (NPS) is contemplating improvements for the wastewater collection and treatment system in the vicinity of Headquarters and Pine Island area in the Everglades National Park Therefore, they commissioned this Value Analysis for the purpose of evaluating and developing improvement alternatives and selecting the most advantageous one.

Several alternative sites and treatment options were considered to determine which sites would provide the best location for the wastewater treatment facilities. A functional analysis of the treatment process was performed to better understand the primary functions and capabilities of the facility.

Additional issues were taken into consideration, such as having the facility out of sight from the park visitors, in an effort to avoid the aesthetic intrusion of manmade facilities into the landscape of the Everglades National Park.

EXISTING DEVELOPMENT

The ENP Headquarters is located just inside the eastern border of Everglades National Park. The Pine Island area is approximately one-half mile southwest of Headquarters, along Pine Island Road in Everglades National Park. See Figure 1 on the following page for a site plan of the area and site locations that were analyzed in this Value Analysis/Choosing by Advantages Team Report.

Both areas are flat, with elevations generally 4 to 6 feet above mean sea level (msl). The developed areas are in the 6 – 8.0 feet above msl range. The climate is hot and humid in the summer and mild in the winter. Rainfall averages 51 inches per year with about eight inches per month falling during the summer, and one to two inches per month during the winter. Pan evaporation averages 64 inches per year. The groundwater level fluctuates seasonally from a few feet below the ground surface to right at the ground surface.

Headquarters consists of NPS offices (with restrooms and a shower) and the Visitor Center (with public restrooms). The Entrance Station, which has an employee restroom, is located about 1,000 feet west of Headquarters.

Pine Island consists of maintenance buildings, a car wash, offices, ten recreational vehicle (RV) sites, a common laundry/shower facility, and employee housing (three one-bedroom units, eight two-bedroom units, and seven three-bedroom units).

SPACE HOLDER FOR FIGURE 1

Four sites were identified as potential locations for wastewater treatment facilities. They are shown in Figure 1 and are:

1. Headquarters
2. Boneyard/Borrow Pit
3. Pine Island Recycle Area
4. Abandoned Airstrip South of the Pine Island Area

EXISTING WASTEWATER TREATMENT AND DISCHARGE SYSTEMS

Wastewater generated at Headquarters and in the Pine Island Area is conveyed by gravity to the respective treatment and discharge systems. The Headquarters wastewater system consists of a large septic system, constructed in 1959. The system includes a single-compartment 3,000-gallon concrete septic tank and leachfield with sixteen 100-foot long leach lines. Because the site is not mounded, the leachfield is typically submerged in groundwater. Also, the facilities at Headquarters have been expanded over the years without increasing the size of the original septic systems.

Water use and sewage flows at Headquarters vary seasonally, with higher flows in the winter and lower flows in the summer. At the Entrance Station there is a small septic tank/leachfield system to serve the employee restroom there.

At Pine Island there are individual septic tanks and leachfields for each house or building. Many of the leach fields are mounded, but are still not high enough to meet the state requirement of a minimum of 24 inches above the groundwater level. In all cases, these wastewater systems are no longer in compliance with the design requirements of the Florida Department of Health (FDOH).

Drinking water is supplied by shallow wells at both sites. There is concern that inadequate wastewater treatment is degrading the quality of the groundwater in the area and endangering the public health.

PERFORMANCE OF EXISTING FACILITY

The existing facilities have never been monitored for flow or performance based on influent and effluent water quality parameters. Therefore, estimates of sewage volumes must be made based on the amount of water used and/or the number of people being served.

New water treatment plants have recently been designed for both Headquarters and Pine Island. Since no irrigation or other significant consumptive water use is prevalent at either site, the volume of water used should essentially be equal to the volume of sewage produced. Therefore, the same design flows used for the water treatment plants may be used for the wastewater treatment plant(s).

The July 1998 report, by the Denver Service Center, titled *Water Treatment Plant Schematic Design and Value Analysis, Package 191B*, provided the following design flows:

Basis of Design:

Pine Island average day, peak month (April, 1998)		13,700 gpd
Headquarters average day, peak month (March, 1998)		1,630 gpd
	Subtotal	15,330 gpd

Considerations:

25% Future increase in demand:		3,833 gpd
25% Design safety factor:		4,791 gpd
	Total	23,954 gpd

Round to:

Peak month average daily water demand (PMADWD)	= 25,000 gpd
Maximum daily water demand = 1.5 x PMADWD	= 37,500 gpd
Maximum hourly water demand (gpm) = 4 x PMADWD	= 69 gpm

The above figures would be for a combined Headquarters and Pine Island treatment facility. Separate PMADWD flows for each area would be 22,300 gpd for Pine Island and 2,700 gpd for Headquarters.

There will also be some groundwater/rainwater infiltration into the sewage collection system(s), but it is assumed this will be roughly offset by leakage out of the water distribution system. For a combined plant or a Pine Island plant there will be no significant seasonal flow variations. A Headquarters plant would have significantly higher flows in the winter than summer (due to variances in visitation levels).

INFLUENT CHARACTERISTICS

The wastewater produced at Pine Island and Headquarters has never been tested in any way. Therefore, the sewage water quality characteristics were assumed to be average for domestic wastewater. This should be accurate since no unusual discharges into the collection system are anticipated. There is a car wash at Pine Island that will be connected to the sewage collection system, but it is estimated that an average of only two or three cars per day will be washed there and the flow and pollutants contributed by this source will not be significant. See Table 1 for the wastewater composition values that were assumed for the Five-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), Total Suspended Solids (TSS), total nitrogen, and total phosphorus.

TABLE 1 – Assumed Wastewater Composition

PARAMETER	CONCENTRATION (mg/L)	DAILY LOADING (pounds/day at 25,000 GPD)
CBOD	200	42
TSS	240	50
Total Nitrogen	35	7
Total Phosphorus	10	2

FUTURE DISCHARGE CRITERIA

The FDEP will require a permit to discharge treated wastewater. The plant must meet a strict set of discharge requirements. Any request by an applicant in Dade County to build a wastewater plant must satisfy discharge requirements set by either the Maimi-Dade Department of Environmental Management (DERM) Best Available Technology (BAT) rules, or by the Florida Department of Environmental Protection (FDEP) Advanced Waste Treatment (AWT) rules. The governing rules will be determined by the permitted capacity of the treatment facility. Treatment works under the 100,000 gpd threshold will be governed by BAT rules and facilities greater that 100,000 gpd will be subject to AWT. Therefore, the new facilities will be governed by BAT rules.

TABLE 2 – DERM BAT and FDEP AWT Maximum Allowable Pollutant Concentrations (Average Annual Values)

Parameter	DERM BAT Rule	FDEP AWT Rule
BOD_5	10 m/L	5 mg/L
Total Suspended Solids	10 m/L	5 mg/L
Total Nitrogen (as N)	10 m/L	3 mg/L
Total Phosphorus (as P)	1 m/L	1 mg/L

The treatment facilities will also need to meet requirements of the 1994 Florida Everglades Forever Act (EFA) that restricts phosphorus discharge levels. The acceptable discharge concentration of total phosphorus has not been set yet. The Act requires that FDEP establish the allowable phosphorus limit based on scientific research. However, the Act provides 10 parts per billion (0.01 mg/l) as a default standard if the FDEP does not set a phosphorus standard by 2003. The discharge requirement for the Park WWTP has not been set yet, but will most likely be limited to 0.05 mg/L (as P) at the compliance monitoring wells. This will allow further dilution of the phosphorus to meet compliance with the EFA at the surface/groundwater interface.

Individual on-site treatment and disposal systems must be designed to meet the construction standards of the Florida Department of Health (FDOH) FAC rule 64E-6, instead of meeting any set of DERM or FDEP discharge requirements.

It is in the best interest of the NPS, from an operational and reliability standpoint to meet Class I reliability requirements for the facilities. FDEP will most likely not require Class I reliability for the improvements, but in order to be consistent with the water quality goals of the South Florida Water Management District Restoration Program this level of assurance is recommended.

Anticipated permit discharge requirements are summarized in Table 3 on the following page.

TABLE 3 – Anticipated Future Discharge Limitations

			Reclaimed Water Limitations				
Parameter	**Units**	**Max./Min.**	**Annual Average**	**Monthly Average**	**Weekly Average**	**Single Sample**	**Monitoring Frequency**
Flow	mgd	Maximum	-	3-month ADF			Daily 5/week
$CBOD_5$	mgd	Maximum	10				Monthly
TSS	mgd	Maximum	10				Monthly
Fecal Coliform Bacteria	The arithmetic mean of the monthly fecal coliform values collected during an annual period shall not exceed 200 per 100 mL of reclaimed water sample. The geometric mean of the fecal coliform values for a day during a period of 30 consecutive days (monthly), shall not exceed 200 per 100 mL of sample. No more than 10 percent of the samples collected during a period of 30 consecutive days shall exceed 400 fecal coliforms values per 100 mL of sample. Any on sample shall not exceed 800 fecal coliform values per 100 mL of samples.						Monthly
PH	Std. Units	Range	-			6.0 - 8.5	Daily 5/week
Total Residual Cl^2	mg/L	Minimum	-			0.5	Daily 5/week
Nitrate (as N)	mg/L	Maximum	-			10	Monthly
Phosphorus (as P)	mg/L	Maximum	-			1.0	

LIST OF VA/CBA STUDY MATERIAL

1. Design Analysis, Package 191C, Final Report, January 2001, The Denver Service Center
2. Everglades National Park Map

SITE LOCATIONS

There are three disturbed sites where a treatment plant could be built with little removal of vegetation. These sites are the Boneyard/Borrow Pit area between Headquarters and Pine Island, the abandoned airstrip near Pine Island, or the recycle area at Pine Island (see Figure 1 for the locations of these sites). The recycle area is the closest of the three sites to the domestic supply well (approximately 600 feet away) and to residents, which may be a disadvantage.

Stakeholders

In order to understand the context for this project the study team developed a list of "Stakeholders". The stakeholders are comprised of people or groups with an active interest in the making of project decisions or the results of any decisions. Table 4 on the following page lists the stakeholders and their primary interests and needs.

TABLE 4 – Stakeholders

Stakeholders	Primary Interests (Needs)	Secondary Interests (Wants)
Florida Department of Environmental Protection	Compliance with BAT and Everglades Forever Act Rules and Regulations	Minimize Conflict Between Public and Private Concerns (Litigation)
General Public	Protect the Park Environment (consistent with other Everglades Programs)	Cost Effective Improvements and Accountability
Park Personnel	• Low Profile (No Problems) • Best Possible Aesthetics	• Minimize O&M Costs • Be Proud of the Project
NPS	• Demonstrate Environmental Excellence • Good Public Relations • Comply with Current Regulations	Construct a Low Cost Sustainable Project
Politicians: Local, State, and Federal	• No Problems • Low Profile	Environmental Stewardship
Plant Operators	Efficient, Safe and Reliable Plant	Low and Easy Maintenance
Natural Resources	• No Negative Impacts • Improve Flora, Fauna and Water Quality	Minimize Footprint
Park Visitors	• Reliable Facilities • No Odors • Minimize Noise • Aesthetics	• Protect the resources • Be Environmentally Sound
Neighbors (Agricultural, Indian Tribes, Environmental Groups and Other Parks	Fair and Equitable Project	Possibly Use the Project as a Model
Research Groups	• Research data • Park Availability	Recognition for Further Research

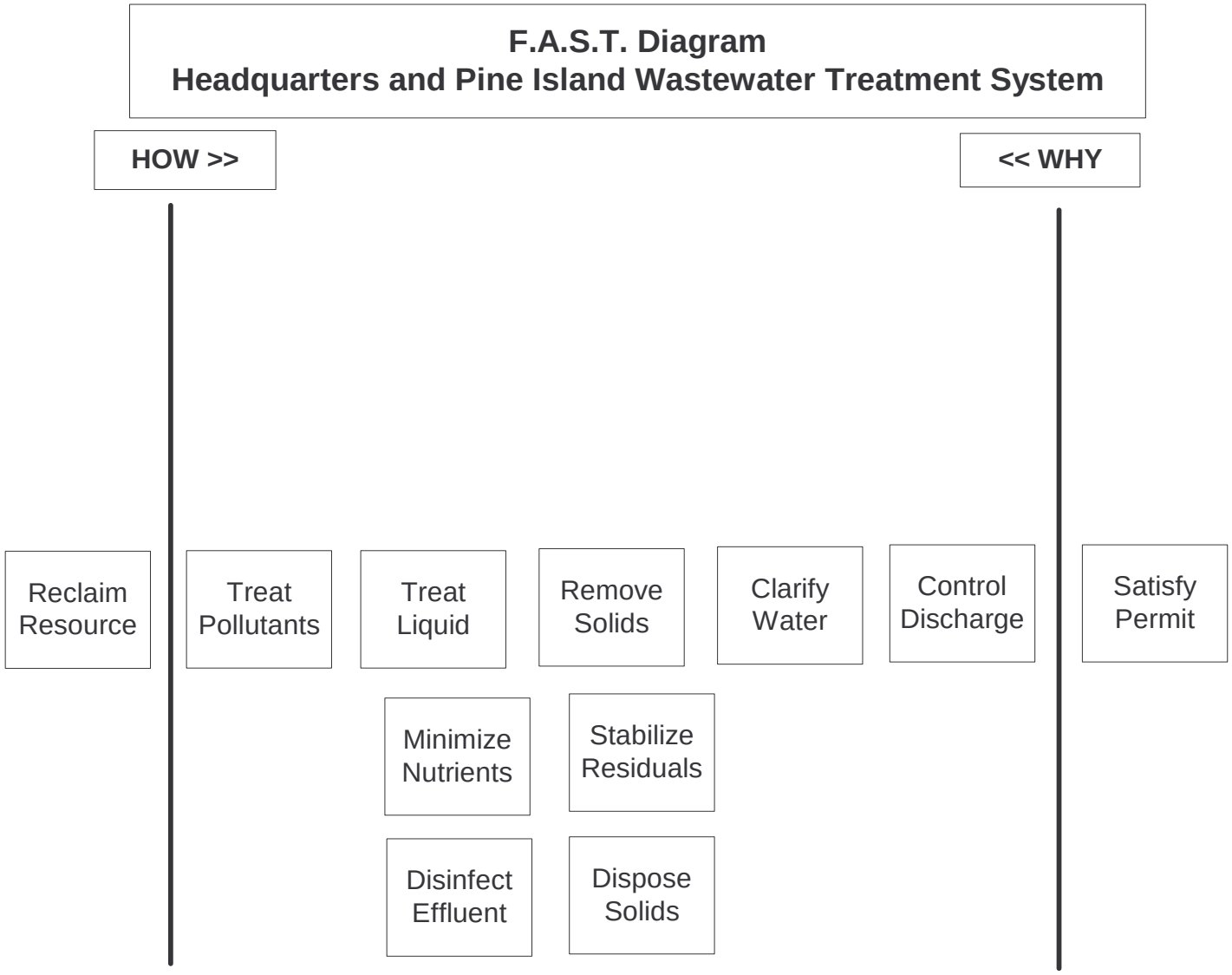
FUNCTIONAL ANALYSIS PHASE

This phase ensures that all team members completely understand the functions required. The team paints a functional portrait of the project and evaluates program needs versus wants.

A Functional Analysis was prepared to determine the basic function of the overall project and each area shown in the cost model. Functional Analysis is a means of evaluating the functions of each element to see if the expenditures for each of those elements actually provide the requirements of the process, or if there are disproportionate amounts of money spent on support functions. These elements add cost to the final product, but have a relatively low worth to the basic function. This creates a high cost-to-worth ratio.

Functional analysis is a technique used to identify elements of a system or process. The basic exercise is to describe elements and the function they perform using only a verb and a noun. The Functional Analysis System Technique (F.A.S.T.) diagram is a type of flowchart that as you move left to right you ask how the function works. As you move from right to left you ask why you perform the function. The concept helps the team think about the basic functions and their relationship to other functions in the overall project. A F.A.S.T. diagram was prepared to further graphically display the critical path of the overall project's basic functions and is included on the next page.

DESCRIPTION	**FUNCTION**		
	VERB	**NOUN**	**KIND**
Wastewater Influent	Reclaim	Resources	HO
Treatment Process	Remove	Pollutants	B
Water Treatment	Treat	Liquid	B
Residuals Treatment	Remove	Solids	B
Solids Settling	Clarify	Water	B
Monitor and Control Flows	Control	Discharge	B
Effluent Quality	Satisfy	Permit	LO
Biological Nutrient Removal	Minimize	Nutrients	S
Microbiological Disinfection	Disinfect	Effluent	S
Dewater and Treat Solids	Stabilize	Residuals	S
Haul and Dispose of Residuals	Dispose	Solids	S
Kind of Function: AT = All Time B = Basic C = Causative S = Secondary RS = Required Secondary HO = Higher Order LO = Lower Order U = Unwanted			


F.A.S.T. Diagram
Headquarters and Pine Island Wastewater Treatment System
HOW >>
<< WHY
Reclaim Resource
Treat Pollutants
Treat Liquid
Remove Solids
Clarify Water
Control Discharge
Satisfy Permit
Minimize Nutrients
Stabilize Residuals
Disinfect Effluent
Dispose Solids

CREATIVITY PHASE

The value study team generated several alternatives. The first step was to identify some of the problems with the existing facilities. Those problems are listed below.

1. The existing systems are old and the treatment and disposal requirements under which they were designed have changed.
2. Wastewater generation rates have increased and are approaching or exceeding the current system capacity.

The team brainstormed and identified several general approaches for the wastewater treatment facility. The pros and cons of these general approaches were discussed in relation to the stakeholders' needs and problems with the current system. Based on this discussion, several approaches were selected for further discussion and development. The creative approaches are summarized below.

General Approach	Pros	Cons
1. Construct individual mounds	• No permit required • Expenditure spread over greater period of time • Minimizes O&M • Minimal construction impacts	• Not enough space at HQ • Little if any P removal • Wet season impacts • More point sources • Mounds in peoples yards • Some versions have limited life expectancy
2. Construct separate treatment plants	• Fewer water quality impacts • In case of emergency at one plant the other is still online • NPS controls effluent quality • Better stewardship	• Double permit and O&M issues (2X) • F/M concerns (inadequate food for the bacteria in a biological treatment process) • Not enough space at HQ • Potential P impacts to natural areas • Higher capital costs • Aesthetic issues at HQ • Permit required
3. Construct combined plant for HQ and Pine Island	• Fewer water quality impacts • NPS controls effluent quality • Single point source • Combined F/M • Can be placed in a remote area • Creates space at HQ for parking • Better stewardship	• Larger building footprint • Potential P impacts to natural areas • Higher capital costs • Higher O&M costs (1X) • Permit required

General Approach	Pros	Cons
3a. Percolation Pond and plant at the Boneyard/Borrow Pit area	• Centralizes collection, treatment and disposal within the park • Probably further from surface water than the airstrip (OFW) • Can restore other Park areas via excavation removals • Less land requirement than sprayfield • Permit may not be necessary • Constructing on disturbed land	• Fill has to be imported • Dependent on another project for fill (Time) • Disking of pond bottom
3b. Percolation pond at the abandoned airstrip and plant at the Recycling Facility area	• Can restore other Park areas via excavation removals • Constructing on disturbed land • Less land requirement than sprayfield • Removes habitat for invasive vegetation • Marginally further from Park residents and user areas • Some fill is adjacent • Less fill required than Borrow Pit	• Higher cost because a remote site • Closer to the surface water source
3c. Effluent disposal to the City of Homestead and plant at the Boneyard/Borrow Pit area	• Minimizes land requirement in the Park • Best stewardship of ENP • NPS controls treatment and effluent quality	• Cost to pump effluent offsite • Public perception • Requires treated transmission facilities • Potential line damage and spill • Increased O&M

General Approach	Pros	Cons
3d. Sprayfield at the abandoned airstrip and the plant at either the Boneyard/Borrow Pit or at the Recycling Facility	• Can restore other Park areas via excavation removals • Constructing on disturbed land • Removes habitat for invasive vegetation • Marginally further from Park residents and user areas • Some fill is adjacent • Less fill required than Borrow Pit • Less nutrient loading per unit area	• Higher cost because a remote site • Closer to the surface water source • Need wet weather storage (lined lagoon)
3.e Enter an Inter-agency Agreement (IAA) for Offsite Land (disposal)	• Minimizes land requirement in the Park • Best stewardship of ENP • NPS controls treatment and effluent quality	• Time delay to locate and negotiate IAA • No available funding for IAA lease
4. Pump Sewage to the City of Homestead	• No Operation Permit • Minimal O&M expense • No point source in ENP • Smaller footprint • Supporting the local economy	• Loss control of effluent disposal quality and location • Potential bulk rate increase for EFA compliance • Public perception • Greater capital cost • Potential to lose the buffer area (secondary development) • Reliability redundancy issues • Raw storage in case of line break • Might have to pre-treat (bubbler, grinder, etc.) • Outside service area surcharges

General Approach	Pros	Cons
5. Do Nothing Use "As-Is"	• Lowest cost • No permits	• Not a good steward • Minimal treatment • Risk to water supply • Continued emergency maintenance • Currently exceeding design capacity • End of life expectancy • Does not meet current regulations
6. Enter an Inter-agency Agreement (IAA) for Offsite Land	• Minimizes land requirement in the Park • Best stewardship of ENP • NPS controls treatment and effluent quality	• Cost to pump raw offsite • Public perception • Requires treatment and transmission facilities • Potential line damage and sewer spill • Increase security • Increased O&M • Time delay to locate and negotiate IAA • No available funding for IAA lease

EVALUATION PHASE

The team identified eight evaluation factors that included:

- Prevent loss of natural resources,
- Maintain and improve conditions of resources,
- Protect public health, safety and welfare,
- Improve park operational efficiency and sustainability,
- Protect employee health and welfare,
- Provide other advantages to the National Park Service,
- Construct an environmentally responsible project and
- Be consistent with South Florida Water Quality Restoration Goals.

The VA Team identified, discussed and listed the attributes of each alternative. The advantages were then decided based on the attributes. The CBA spreadsheet on the following pages was used to record the attributes and advantages of each alternative. The team underlined the least preferred attribute and circled the most import advantage for each of the evaluation factors.

Factor No. 2, Maintain and Improve Condition of the Resources, was determined to be the highest priority for treatment facility and site selection. The VA Team agreed that the alternative to pump sewage to Florida City had the Paramount Advantage and was given a ranking 100. The most important advantages for each factor were ranked according to its relationship to the Paramount Advantage. For example, Factor 1 – Prevent Loss of Resources, the most important advantage was ranked with a value of 90 and so forth for each of the circled advantages.

The team then scored each alternative based on the most important advantage for the representative factor. For Factor 2 all to the advantages for that factor are compared and ranked according to the Paramount Advantage score of 100. All of the advantages for Factor 1 are compared and ranked according to the most important advantage score of 90. Factor 4 advantages are compared and ranked according to the most important advantage score of 75, etc.

After all of the advantages were ranked, the scores were added and totaled for each alternative. The CBA Spreadsheet that follows shows the total scores, initial capital costs and Present Worth Life Cycle Costs for all of the alternatives.

PMA Consultants LLC

EVERGLADES NATIONAL PARK - HEADQUARTERS AND PINE ISLAND WASTEWATER TREATMENT FACILITIES
Choosing by Advantages

COMPONENT: Wastewater Treatment Facility							FUNCTION: Reclaim Resource					
FACTOR	ALTERNATIVES											
	Alternative 1		**Alternative 2**		**Alternative 3**		**Alternative 4**		**Alternative 5**		**Alternative 6**	
	Construct Individual Mounds		**Construct Separate Treatment Plants**		**Construct Combined Plant for HQ and Pine Island**		**Pump Sewage to the City of Homestead**		**Do Nothing Use "As-Is"**		**Enter an Inter-agency Agreement (IAA) for Offsite Land**	
PROTECT CULTURAL AND NATURAL RESOURCES												
FACTOR 1 - Prevent Loss of Resources												
Attributes	Improves separation between application area and groundwater Less loading in a given area Little P removal		Class I reliability Pollutant removals Two footprints Point source discharge Application area close to surface water		Class I reliability Pollutant removals Point source discharge Application area close to surface water		Removes treatment and effluent disposal from the Park		Does not prevent losses		Class I reliability Removes treatment and effluent disposal from the Park Pollutant removals	
Advantages	Slight prevention	20	Moderate prevention	75	Considerable prevention	80	Greatest Prevention	90	Least prevention	0	Considerable prevention	85
FACTOR 2 - Maintain and Improve Condition of Resources												
Attributes	Potential for groundwater degradation		Improves effluent water quality Provides opportunity to restore other Park areas		Improves effluent water quality Provides opportunity to restore other Park areas		Removes treatment and effluent disposal from the Park		Risk for groundwater degradation		Improves effluent water quality Removes disposal from Park	
Advantages	Slight improvement	30	Considerable improvement	85	Considerable improvement	90	Greatest potential for improvement	100	No improvement	0	Considerable improvement	95
PROVIDE FOR VISITOR ENJOYMENT												
FACTOR 3 - Provide Visitor Services and Educational and Recreational Opportunities												
Attributes												
Advantages												
FACTOR 4 - Protect Public Health, Safety and Welfare												
Attributes	New facilities More separation between application and groundwater		C Class I reliability Pollutant removals		Class I reliability Pollutant removals		Class I reliability Pollutant removals		Risk for groundwater degradation Potential public exposure to pathogens		Class I reliability Pollutant removals	
Advantages	Minimal protection	15	Moderate protection	60	Considerable protection	65	Greatest protection	75	Least protection	0	Considerable protection	65
IMPROVE EFFICIENCY OF PARK OPERATIONS												
FACTOR 5 - Improve Operational Efficiency and Sustainability												

COMPONENT: Wastewater Treatment Facility												
FACTOR	FUNCTION: Reclaim Resource ALTERNATIVES											
	Alternative 1		**Alternative 2**		**Alternative 3**		**Alternative 4**		**Alternative 5**		**Alternative 6**	
Attributes	Maintain onsite pumps and blowers		Dual systems		Centralized system Efficient		O&M for collection and transmission only Connection and monthly fees Sustainable by existing capacity at constructed plant		Periodic repair of existing facilities		Centralized system Additional transmission system Travel offsite Requires security	
Advantages	Easiest to sustain and maintain	80	Hardest to sustain and maintain	5	Moderate efficiency and sustainability	70	Moderate efficiency and sustainability	65	Least sustainability and down-times are inefficient	0	Moderate efficiency and sustainability	40
FACTOR 6 - Protect Employee Health, Safety and Welfare												
Attributes	Periodic exposure to mechanical and biological hazards		C Class I reliability Daily exposure to biological, mechanical and chemical hazards (2X)		Class I reliability Daily exposure to biological, mechanical and chemical hazards		Periodic exposure to mechanical and biological hazards		Periodic exposure to biological hazards		Class I reliability Daily exposure to biological, mechanical and chemical hazards	
Advantages	Moderate exposure to hazards	55	Least protection to hazards	0	Moderate exposure to hazards	55	Minimal exposure to hazards	75	Least exposure to hazards	80	Moderate exposure to hazards	55
PROVIDE COST-EFFECTIVE, ENVIRONMENTALLY RESPONSIBLE, AND OTHERWISE BENEFICIAL DEVELOPKENT FOR THE NPS												
FACTOR 7 - Provide Other Advantages to the National Park System												
Attributes	Keeps the grass green in spots		Improves water quality No economy of scale		Improves water quality Provides economy of scale Centralizes operations		Limited footprint No chemicals or vertical construction No onsite disposal		Does not meet current Rules		Improves water quality Provides economy of scale Centralizes operations No onsite treatment or disposal	
Advantages	Minimal Advantage	5	Moderate Advantage	50	Considerable advantage	90	Considerable advantage	90	Least Advantageous	0	Considerable advantage	80
Factor 8 – Construct an Environmentally Responsible Project												
Attributes	Potential for groundwater degradation		Improves effluent water quality Provides opportunity to restore other Park areas		Improves effluent water quality Provides opportunity to restore other Park areas		Removes treatment and effluent disposal from the Park Transfers pollution to another location		Risk for groundwater degradation		Improves effluent water quality Removes disposal from Park Transfers pollution to another location	
Advantages	Minimally responsible	20	Responsible	75	Responsible	90	Most responsible	95	Not responsible	0	Responsible	80
PUBLIC/STAKEHOLDERS PERCEPTION												
Factor 9 – Be consistent with South Florida Water Quality Restoration Goals												

COMPONENT: Wastewater Treatment Facility							FUNCTION: Reclaim Resource					
FACTOR	ALTERNATIVES											
	Alternative 1		**Alternative 2**		**Alternative 3**		**Alternative 4**		**Alternative 5**		**Alternative 6**	
Attributes	Potential for groundwater degradation		Improves effluent water quality Provides opportunity to restore other Park areas Chemical treatment may present other problems		Improves effluent water quality Provides opportunity to restore other Park areas Chemical treatment may present other problems		Removes treatment and effluent disposal from the Park Transfers pollution to another location		Risk for groundwater degradation		Improves effluent water quality Removes disposal from Park Transfers pollution to another location Chemical treatment may present other problems	
Advantages	Less consistent	10	More consistent	50	More consistent	50	Less consistent	10	Least consistent	0	Less consistent	20
TOTAL IMPORTANCES OF ADVANTAGES		**235**		**400**		**590**		**600**		**80**		**520**
Initial Cost (Net)	$1,481,250		$2,137,500		$2,237,500		$4,200,000		$0		$3,175,001	
Re-design Cost												
Compliance												
Life Cycle Cost (Net)	$1,796,407		3,784,778		$3,794,952		$4,592,800				$4,732,453	

DEVELOPMENT PHASE

The Development Phase consisted of estimating the cost for the various alternatives and the development of a matrix to numerically compare alternatives by cost per advantage point. Operation and maintenance costs for each alternative were also developed so that a net present worth for each alternative could be developed. The lowest cost is not necessarily the best value because it may also have the least advantages. The lowest cost per advantage point evaluation considers both components of advantages and cost when selecting an alternative. The following table demonstrates this comparison.

INDIVIDUAL MOUNDS COST ESITIMATE				
Description	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Headquarters Imported Fill	3,000	CY	$25	$75,000
Headquarters Lift Stations	2	EA	$15,000	$30,000
Headquarters Adsorption Lines	2,000	LF	$40	$80,000
Pine Island Imported Fill	9,000	CY	$25	$225,000
Pine Island Lift Stations	25	EA	$15,000	$375,000
Pine Island Adsorption Lines	5,000	LF	$40	$200,000
Pine Island Septic Tanks	25	EA	$8,000	$200,000
			Subtotal	$1,185,000
			25 % Contingency	$296,250.00
TOTAL NET CONSTRUCTION COST				**$1,481,250.00**

TWO SEPARATE PLANTS COST ESITIMATE				
Description	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Headquarters WWTP	1	LS	$250,000	$250,000
Headquarters Injection Well	1	LS	$3,000,000	$3,000,000
Pine Island WWTP	1	LS	$450,000	$450,000
Pine Island WWTP Control Building	1	LS	$300,000	$300,000
Pine Island Gravity Sewer Lines	2,000	LF	$35	$70,000
Pine Island Force Mains	6,000	LF	$40	$240,000
Pine Island Lift Stations	13	EA	$20,000	$260,000
Pine Island Infiltration Pond	1	LS	$100,000	$100,000
			Subtotal	$4,670,000
			25 % Contingency	$1,167,500
TOTAL NET CONSTRUCTION COST				**$5,837,500**

CENTRAL PLANT COST ESITIMATE				
Description	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Combined WWTP	1	LS	$500,000	$500,000
WWTP Control Building	1	LS	$300,000	$300,000
Gravity Sewer Lines	2,000	LF	$35	$70,000
Force Mains	7,500	LF	$40	$300,000
Lift Stations	15	EA	$20,000	$300,000
Infiltration Pond	1	LS	$120,000	$120,000
Polishing of P	1	LS	$200,000	$200,000
			Subtotal	$1,790,000
			25 % Contingency	$447,500.00
TOTAL NET CONSTRUCTION COST				**$2,237,500**

CONNECT TO FLORIDA CITY COST ESITIMATE				
Description	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Directional Drill under Canals	1500	EA	$80	$120,000
Gravity Sewer Lines	2,000	LF	$35	$70,000
Force Mains	45,000	LF	$60	$2,700,000
Master Lift Station	2	EA	$150,000	$300,000
8-inch connection to City	1	LS	$7,500	$7,500
8-inch plug valves	50	EA	$1,500	$75,000
Air Release Valves	50	EA	$1,650	$82,500
Testing Allowance	1	LS	$5,000	$5,000
			Subtotal	$3,360,000
			25 % Contingency	$840,000.00
TOTAL NET CONSTRUCTION COST				**$4,200,000**

INTER-AGENCY AGREEMENT FOR OFFITE FACILITY COST ESITIMATE				
Description	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Combined WWTP	1	LS	$500,000	$500,000
WWTP Control Building	1	LS	$300,000	$300,000
Gravity Sewer Lines	2,000	LF	$35	$70,000
Force Mains	7,500	LF	$40	$300,000
Lift Stations	15	EA	$20,000	$300,000
Infiltration Pond	1	LS	$120,000	$120,000
Master Lift Station	1	EA	$150,000	$150,000
Force Main to Pond Offsite	16000	LF	$50	$800,000
Land Lease and Negotiation	1	LS	$1	$1
			Subtotal	$2,540,001
			25 % Contingency	$635,000
TOTAL NET CONSTRUCTION COST				**$3,175,001**

CONSTRUCTION, LIFE CYCLE COST AND COST PER ADVANTAGE POINT

ALTERNATIVE	DESCRIPTION	CONSTRUCTION COSTS	O&M COSTS		NET PRESENT WORTH	ADVANTAGE POINTS	CONSTRUCTION COSTS ($/POINT)	TOTAL NET PRESENT WORTH ($/POINT)
1	Construct individual mounds	$1,481,250	$32,093	$315,157	$1,796,407	235	$6,303	$7,671
2	Construct separate treatment plants one effluent location	$5,837,500	$168,800	$1,657,278	$7,484,778	440	$13,267	$17,011
3	Construct combined plant for HQ and Pine Island	$2,237,500	$158,600	$1,557,452	$3,794,952	590	$3,792	$6,439
4	Pump Sewage to the Florida City System	$4,200,000	$40,000	$392,800	$4,592,800	600	$7,000	$7,666
5	Do Nothing Use “As-Is”				$0	130	$0	
6	Enter an Inter-agency Agreement (IAA) for Offsite Land (Facility and disposal)	$3,175,001	$158,600	$1,557,452	$4,732,453	520	$6,106	$9,113

RECOMMENDATIONS

It is the EVER 191C VA/CBA Team's recommendation that the NPS proceed with the development of a combined wastewater treatment plant to treat the combined wastewater from Headquarters and Pine Island. This alternative consists of a treatment facility at the Boneyard/Borrow Pit with a percolation/evaporation pond at the same site in the area where the borrow pit can be filled in with the dirt from the Hole-in-the-donut or the treatment facility at the recycle area and a pond in the area of the abandoned airstrip southeast of Pine Island.

This recommendation is based on the results of the Choosing by Advantages Study that determined the alternative to construct a single treatment plant at Everglades National Park is the most advantageous. That alternative scored the lowest cost per advantage point ($6,432) and has the median construction cost ($2,237,500).

APPENDIX

AGENDA
EVERGLADES NATIONAL PARK

VALUE ANALYSIS/CHOOSING BY ADVANTAGES MEETING

MAY 7 - 9, 2002

HEADQUARTERS AND PINE ISLAND WASTEWATER TREATMENT PLANT

Tuesday, May 7, 8:00 AM - Phase I – Information

The goal for this phase is for the team to develop a clear understanding of the project, through review of base data and a functional analysis. The team will identify factors upon which alternatives will be evaluated. Functional areas where significant cost savings or improvement in value can be expected will be identified for further study.

Value Analysis Overview/Objectives for the Study/Schedule..... Team Leader
Project Presentation ..... Design Team
Stakeholders Analysis..... Team

10:00 AM - Phase II – Function Analysis

Functional Analysis and FAST Diagram..... Team Leader/Team
Modeling (Cost, Square Foot, Quality, etc)..... Team
Identification of Areas of Focus..... Team

Noon - Lunch

1:00 PM - Phase III - Creativity

Building on alternatives developed by the design team the value study team will brainstorm operational options and alternative ways of achieving the functions identified for the facility. The process involved the development of ideas without judgment at this point.

Brainstorming Team

Close for Day: *4:30 PM*

Wednesday, May 8, 8:00 AM - Phase IV – Evaluation (Initial)

Finalize Evaluation Factors..... Team
Screening of Alternatives..... Team
Identification of alternatives to develop further..... Team

Noon - Lunch

1:00 PM - Phase V - Development

The value study team will continue to develop the alternatives and developing cost estimates

Development of Alternatives..... Team/Workgroups
Cost Estimates Team/Workgroups
Life-cycle Cost Estimate..... Workgroups

Close for Day: *4:30 PM*

Thursday, May 9, 8:00 AM - Phase V - Development

Final Evaluation using Choosing by Advantages..... Team

Noon - Lunch

1:00 PM - Phase VI – Recommendation

Benefit Cost Analysis..... Team

Finalize Recommendations..... Team

Thursday, May 9, 4:30 PM - Study Closes

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APPENDIX C

FLOODPLAIN STATEMENT OF FINDING

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STATEMENT OF FINDINGS

FOR

EXECUTIVE ORDER 11988 ("FLOODPLAIN MANAGEMENT")

Pine Island Wastewater System Improvements

Environmental Assessment

Everglades National Park

Recommended:_____

Superintendent, Everglades National Park Date

Concurred: _____

Chief, Water Resources Division, WASO Date

Concurred: _____

Southeast Regional Safety Officer Date

Approved: _____

Director, Southeast Regional Office Date

INTRODUCTION

Pursuant to Executive Order 11988 (Floodplain Management), and the National Park Service 1993 Floodplain Management Guideline for implementing the executive order, the National Park Service has evaluated flooding hazards for improvements to the Pine Island wastewater treatment plant in the Everglades National Park, Miami-Dade County, Florida. This statement of findings describes the proposed action, project site, floodplain determination and use of floodplain, investigation of alternatives, flood risks, and mitigation for the construction of the wastewater treatment plant within the 100-year floodplain.

Proposed action

The National Park Service proposes to construct a new wastewater treatment plant and abandon the deteriorating existing septic tanks and drainfields of the current wastewater system. The project involves replacing the collection and effluent discharge lines and constructing a package treatment plant and two new raised infiltration beds that would service the park headquarters, the main park visitor center, and the Pine Island developed area of Everglades National Park for the purpose of providing sanitary sewer service. The footprint of this new system would cover an area of approximately 3.0 acres. Under the preferred alternative, there would be a new system of collection lines, connecting each individual house in housing area, the park entrance station, and headquarters/visitor center complex to one new treatment plant. The existing septic/drainfield wastewater system and over 20 existing septic tanks and drainfields will be abandoned. The new wastewater treatment system would provide an effective, efficient and reliable wastewater treatment system compliant with operating requirements and regulations of the Florida Department of Environmental Protection.

Project Site

Everglades National Park is located in Monroe, Collier, and Miami-Dade County, Florida 50 miles southwest of Miami and covers over 1.5 million acres of the southernmost tip of Florida. The project area is located at Pine Island on a relatively high geological feature know as the Atlantic Coastal Ridge that terminates in Everglades National Park. Pine Island hosts a stand of Dade County slash pine, a critically endangered habitat. Slash pine is the dominant tree, but the pinelands provide habitat for many of the rarest plant species in Florida. More than 98 percent of the Dade County pine forests have been lost outside Everglades National Park. The project area located in Miami-Dade County, Florida, includes a wastewater treatment plant site, 7,500 feet of sewer main pipeline, 2,000 feet of transmission mains, 20 below-ground lift stations and two discharge sites. The wastewater treatment plant and raised infiltration beds are to be located in the development area zone less than ¼ mile south of route 9336. The sewer mains are to be located inside the park's development area zone extending along route 9336 to the park headquarters and along the access road to the housing area. Pine Island's wastewater treatment plant site will be constructed adjacent to the existing recycling facility located ¼ mile south of the housing area. Treated wastewater is discharged from the wastewater treatment system and is piped through a 6-inch pipe to the new raised infiltration beds located ¼ mile south at the second project site on the former airfield site.

Floodplain Determination

According to the Miami-Dade Comprehensive Emergency Management Plan, the most common and repetitive natural hazards that affect the county are hurricanes, tropical storms, tornados,

floods, and wildfires. Low elevation and broad areas of very low relief ranging from 10 feet above see level or less, characterize topography throughout the Everglades National Park. Flood Insurance Rate Map (FIRM) (12025C0450\12025C0435 J July 17, 1995) shows the wastewater treatment plant project area located in the D-zone (Figure 1). In the D-zone, specific flood inundation zones have not yet been determined but the area remains subject to potential flood hazards. To determine potential for flood inundation, flood zones on adjacent FIRM panels were evaluated. Lands immediately adjacent (5 miles east and 10 miles south) of the park headquarters and Pine Island developed area are located in the A-zone and are subject to 100-year flooding. A-zones are located within a special flood hazard area and are subject to flooding but no specific base flood elevations have been established in them. Areas outside of high-hazard areas are a Class II action as defined by the National Park Service Floodplain Management Guidelines (National Park Service 1993).

Parklands further south toward the coastline are subject to the AE and VE-zones which are more vulnerable to storm surges and are considered part of a coastal high-hazard area located within a special flood hazard area. Areas within high-hazard areas are a Class III action. Facilities located in special flood hazard and coastal high-hazard areas are required to meet South Florida Building Codes and Miami-Dade County floodplain management standards.

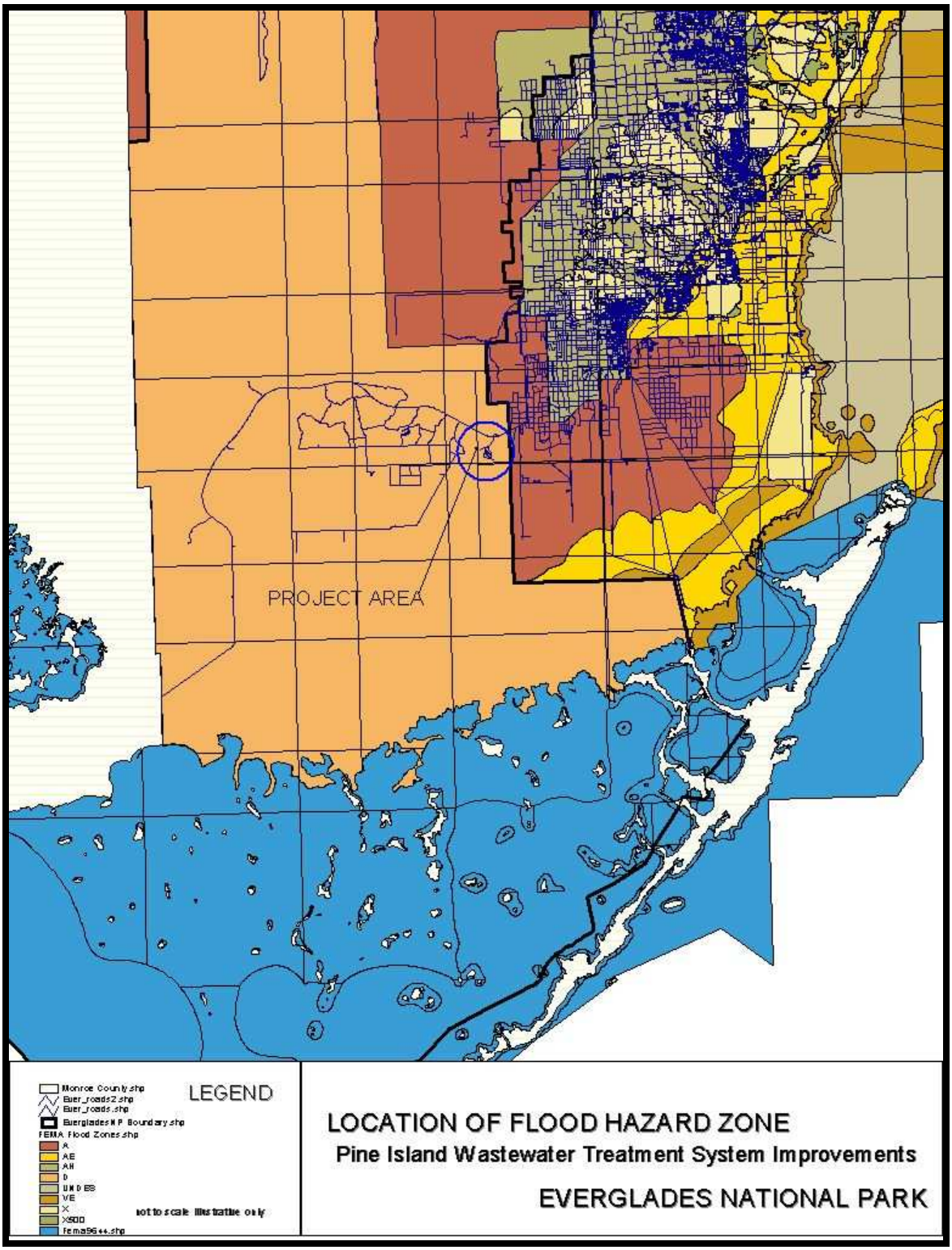

Figure 1 Location of Flood Hazard Zone.

Use of the Floodplain

Since the establishment of Everglades National Park in 1947, the parks mission has been to preserve resources inclusive of hydrological conditions within the park and the south Florida ecosystem. Subsequent agricultural and residential development surrounding the park has increased over the years and substantially changed the hydrology. South Florida's infrastructure of canals, levees and water control structures were created to manage and drain excess water throughout agricultural and developed areas during the wet season. Coastal canals are kept at low levels during the wet season to store and convey floodwaters. The canals and levees are managed to protect developed and agriculture areas surrounding the park from flooding and to control water elevations.

The existing drainfields have historically provided wastewater treatment services for the Pine Island developed area of the park since the late 1950's. Improvements need to be made to comply with current public health regulations. The existing recycling facility site is adequately sized to add the new wastewater treatment facility. Considering the existing park infrastructure, limited availability of developed land and the location of existing park facilities, the most practicable site alternative is to install the new wastewater treatment facility and raised infiltration beds at the existing recycling facility and former airfield sites. Utilizing these existing developed sites and constructing sewer mains and pump stations along the roadway minimizes disturbance of the floodplain.

The risk of flooding is reduced by elevating critical components of the new system above the base flood elevation. The wastewater treatment sludge tank and raised infiltration beds will replace the multiple septic and drainfields consolidating these wastewater treatment operations at two sites. By closing the old septic and drainfields and minimizing the degree of disturbance within the floodplain the action would attain the widest range of beneficial uses of the environment, biological, visitor safety and enjoyment, and cultural resource protection without degradation of park resources. There would be a higher level of health and safety for visitors and park employees by providing dependable wastewater treatment. Replacement of the septic and drainfield system would also reduce the potential impact caused by inadequately treatment wastewater seeping into the groundwater and surrounding wetlands. Although the action would potentially disturb some 7,500 linear feet of 100-year floodplain to construct sewer mains, surface grades would be restored. No substantial increase in impermeable surface resulting in surface runoff would occur therefore there would be a negligible, short-term adverse impact to the floodplain.

Investigation of Alternatives and Flood Risk

Because the entire park lies in the 100-year floodplain park facility development, rehabilitation, or reconstruction in the floodplain has historically been the only practicable alternative. Alternatives considered for the wastewater treatment improvements analyzed to determine if they involve less flood risk include: individual mound systems, separate wastewater treatment for the park headquarters, connecting to an existing municipal wastewater system, and various effluent discharge options such as deep well injection, pumping to a percolation pond, and wastewater reuse.

The National Park Service considered constructing a new wastewater treatment facility at the park headquarters and a second one at the Pine Island developed area. This would reduce the

flood risks associated with the outdated drainfields but would also increase the total impervious area at both sites. New structures would be elevated above base flood elevation to reduce flood risk to structures, but an efficient wastewater operation would not be provided over the long term. Duplication of infrastructure would increase maintenance and operation costs as well as increase flood risks over the long-term by increasing surface water runoff from developed areas. Flood damage risks would increase through loss of function and time necessary to restore two fully functioning wastewater systems.

Construction of individual mound systems would not provide phosphorus removal, would require large amounts of fill, and would expand beyond existing boundaries in several places, disturbing vegetated portions of the floodplain. Additional maintenance of the deteriorating septic tanks would be needed to prevent leaching of inadequately treated wastewater into the groundwater. Achieving federal, state and local wastewater standards would not be consistent. Flood damage risks would increase through loss of function and time necessary to restore a fully functioning wastewater system. In addition inundation could cause seepage of untreated wastewater.

Connecting with the Miami-Dade County municipal wastewater system would extend the wastewater main lines and require construction of additional lift stations at on-site and off-site locations east of the park. Extending the wastewater mains increases the disturbance within natural areas of regional importance. It would also encourage additional commercial and residential development on agriculture lands adjacent to the park. This action would require more construction within the 100-year floodplain thereby increasing the risk of structural damage caused by flooding and reducing efficiency by increasing the service delivery time for wastewater treatment systems.

Various effluent discharge alternatives would involve modifying either surface or groundwater hydrology within the floodplain. These alternatives would also require new construction, expansion, or retrofitting of a percolation pond or the existing septic fields and further disturbance of the floodplain from construction of sewer mains, lift stations, and discharge lines.

Flood Risk of Project Site

Everglades National Park is located in a coastal high-hazard area, has special flood hazard areas, and is subject to high groundwater levels, flooding and tides. Special flood hazard areas are low lying elevations that are subject to inundation by flooding. High-risk coastlines are those that have low coastal elevations, erodible substrate and high wave and tide energy. Hydrologic conditions in the park are influenced by both weather and the water management operations of the central and south Florida project. The project site would be subject to inundation from the less frequent 1-percent-annual-chance flood event. During small storm events rainwater generally drains from higher uplands and surrounding areas through canal C111 and Taylor Slough into Florida Bay. Surface drainage in the park during the less than 10-year event is controlled by the natural wetlands and to a lesser extent; canals that help to divert drainage around developed zones. During larger storm events winds, tides, and wind tides increase, groundwater levels rise, and canals would fill. Storm surge elevations from a storm event with a 10-year recurrence interval were estimated to reach 3 to 4 feet for the south Florida coast (Anders et al, 1989).

The wastewater treatment plant area and raised infiltration bed site is set back more than 10 miles inland from the coastal area at elevations ranging from 4 to 6 feet above sea level. These areas are generally protected from large waves caused by coastal storm surges. Severe coastal storms do not occur every year and risk for storm surge elevations higher than 4 to 5 feet are low. Storm

tide elevations along the southwestern coast during the most recent severe storm Hurricane Andrew in 1992 ranged from 4 to 5 feet further south at the park's lower elevations near Flamingo and did not flood any of the parks developed areas.

Larger tropical storm events particularly hurricanes may expose the wastewater treatment plant, discharge pond and pipeline, pump stations and sewer mains in the immediate project area to flooding. More severe storms may expose the area to high velocity winds that could be threatening to life and property. Wind velocities combined with storm tides would be capable of increasing tidal elevations anywhere from 2 to 5 feet for a category 1 event to close to 7 feet above the norm for a category 2 event and wind velocities from 70 - 100 miles per hour. The strongest winds during Hurricane Andrew in 1992 occurred in southern Miami-Dade and northern Monroe Counties and was estimated at 145 mi/hr with gusts to 175 mi/hr (USGS 1994). Coastal flooding combined with high winds can cause changes in hydraulic gradients from storm tides moving upstream and impact structures, damage system pipes, tanks, and pump stations. Flooding of wastewater ponds or sludge tanks could expose personnel and public to disease and scattered toxic, or explosive gases and can contaminate the potable water supply.

Assessing potential impacts from a coastal flood hazard involve evaluating risk of exposure of life and property to a flood event and consequences of that exposure. For Everglades National Park this requires consideration of risk and protection of visitors, park staff, concessionaires, property, and essential infrastructure to coastal flooding.

Public visitors and most park staff and concessionaire staff other than maintenance crews would not typically utilize the wastewater treatment plant area thereby reducing risk to life. Implementation of the Everglades National Park Hurricane Plan further minimizes potentially life-threatening flood hazards by providing a park wide warning and evacuation plan during the hurricane season (June 1 to November 30). The major flood risks associated with a service property such as wastewater and sewer systems include backup of sewage into buildings due to facility failure, physical damage to the pipes, pump stations and holding tanks, and contamination of water and surrounding wetlands by sewage.

Storm duration is the main factor that influences the risk of exposure to people and property. Tropical storm tracking, position estimates, and intensity forecasts are conducted several times daily. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Intensity forecasts use surface wind and radial extent in quadrants relative to the storm center to predict when the storm will hit land. Warnings are initiated within 72 hours before landfall of the pending tropical storm and once enacted the evacuation is park-wide.

The wastewater treatment facilities are in west of Taylor Slough and are afforded some flood protection by being higher than the elevation of some of the surrounding wetlands. The new wastewater treatment plant would be adequately anchored, elevated above grade, and include design techniques for protection against high winds and flood damage in accordance with South Florida Building Code and the Miami-Dade County Floodplain management standards. Electrical and mechanical equipment would also be elevated and protected.

MITIGATIVE ACTIONS

The proposed action would minimize the increase in the overall developed footprint in the 100-year floodplain by removing multiple septic and drainfields from operation and consolidating wastewater operations. Consolidation of these operations reduces the long-term maintenance on

more than 20 septic and drainfields and stops the leaching of inadequately treated wastewater into groundwater and wetlands. Sewer mains would reduce direct disturbance of the floodplain by being constructed along existing roadways. However because the wastewater treatment plant and raised infiltration beds are located in a potential flood hazard area the risk to property can be reduced through mitigation but cannot be eliminated.

In accordance with EO 11988 flood protection will be provided for the critical components of the new wastewater treatment system by elevating and securing them above flood elevation level. The raw influent discharge pipe would be elevated above the rim of the treatment holding tank(s) and designed to discharge above the base flood elevation into the tank. New pump station valves are to be located below ground and sewer mains will be properly embedded to minimize damage from surface erosion, debris and flooding.

Sustainable flood mitigation for the new pump lift stations would be designed so that they are resistant to floodwaters entering or accumulating within system components. Valves will be protected from debris impact, velocity flow, wave action and erosion. Treatment plant pump stations will be equipped with an emergency portable gasoline powered generator connector.

To improve the protection of park property a wastewater treatment plant hurricane hazard plan will be developed. This plan will address pre and post hurricane preparedness measures in accordance with the *Hurricane Preparedness for Domestic Wastewater Treatment Plants* guidelines established by the Florida Department of Environmental Protection.

The National Park Service will continue to operate these facilities using the Everglades National Park Hurricane Plan, an operational hazard implementation plan that lowers the threat to life and property. This plan is coordinated with the Miami-Dade, Collier, and Monroe County Departments of Emergency Management. The plan is reviewed and updated annually to ensure maximum human safety.

SUMMARY

This proposed action constitutes the continuation of a risk to life and property reduced by implementation of sustainable flood mitigation designs and park hurricane hazard plan. The National Park Service wastewater treatment plant improvements will continue to be operated in a potential flood hazard area. No fill, alteration of floodplain or wetlands that would increase potential flood damage would be needed for structural support of the new treatment facility, discharge pipes or placement of pumps and sewer mains. The park will continue to implement the Everglades National Park hurricane hazard plan to protect and lower the risk to life and property during tropical storm season from June to November. This plan will be reviewed and updated to incorporate hurricane preparedness measures for wastewater treatment plants. Flood losses will be reduced by ensuring that new construction and improvements in flood prone areas is protected from flood damages.

By converting from existing septic and drainfield facilities and minimizing and restoring any land disturbance within the floodplain, the project continues to protect local and regional areas of unique natural beauty, wetlands, and wildlife and avoids adverse environmental impacts to the maximum extent.

Finally, the project would provide effective life essential wastewater treatment and efficient operations in compliance with state and local water quality standards.

REFERENCES

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APPENDIX D

EASTERN INDIGO SNAKE CONSERVATION AND PROTECTION PLAN

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Eastern Indigo Snake Conservation and Protection Plan

Everglades National Park ("park") will implement an Eastern indigo snake conservation and protection plan for the entire length of the proposed project corridor that traverses suitable Eastern indigo snake habitat. This plan is the park's proposal to minimize adverse effects from implementation of the proposed project to the Eastern indigo snake. Components of the plan are listed below:

1. The park will minimize the potential of heavy equipment injuring or killing an Eastern indigo snake by incorporating the Standard Protection Measures for the Eastern Indigo Snake in the project design (see below).

2. The park will obtain all appropriate handling and relocation permits for work with the Eastern indigo snake. Copies of all permits will be forwarded to the Service's South Florida Ecological Services Office, Vero Beach, Florida.

3. To further minimize potential adverse effects to the Eastern indigo snake, the park will implement a relocation plan that includes the following:

    a. staked silt fence will be installed along the entire project area that supports either tortoise or wetland habitats to limit emigration of Eastern indigo snakes onto the project limits. The silt fence will be buried in the ground and extend up 2 feet;

    b. immediately prior to clearing and grubbing activities, all potentially suitable denning areas (e.g. gopher tortoise burrows [active, inactive, and abandoned], rat holes, tree stumps) within the project area will be scoped for the presence of Eastern indigo snakes. If an Eastern indigo snake is not discovered, the denning area will be collapsed to prevent re-entry by snakes;

    c. all observed Eastern Indigo snakes will be captured, transported and released immediately outside of the silt fence project area boundary. All relocated individuals will be released on the side of the project area that has the greatest amount of remaining indigo snake habitat;

    d. during clearing and grubbing activities, the project area fence will be walked each morning. If an Eastern Indigo snake is discovered, it will be captured and relocated using the same protocol as 2.c above;

    e. if clearing and grubbing activities occur in discrete sections, this process will be repeated in each applicable section;

    f. only individuals with the appropriate handling permits will be authorized to capture and relocate Eastern indigo snakes;

    g. all captured Eastern indigo snakes will be released as soon as possible in appropriate habitat; and

    h. upon completion of all surveys and relocations, a report detailing the results of all Eastern indigo snake surveys and relocations will be submitted to the Service.

To implement the above Eastern indigo snake protective measures, the park will comply with the following Standard Protection Measures for the Eastern Indigo Snake:

1. An Eastern indigo snake protection/education plan shall be developed by the park for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The education materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (e.g., an observer trained to identify Eastern indigo snakes could use the protection/education plan to instruct construction personnel before clearing activities occur).

   Information signs should be posted throughout the construction site and contain the following information:

   a. a description of the Eastern indigo snake, its habits, and protection under Federal Law;

   b. instructions not to injure, harm, harass, or kill the species;

   c. directions to cease clearing activities and allow the Eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and

   d. telephone numbers of pertinent agencies to be contacted if a dead Eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, then frozen.

2. Only an individual who has been either authorized by a section 10(a)(1)(A) permit issued by the Service, or authorized by the FWC for such activities, is permitted to come into contact with or relocate and Eastern indigo snake.

3. If necessary, Eastern indigo snakes shall be held in captivity only long enough to transport them to the release site; at no time shall two snakes be dept in the same container during transportation.

4. An Eastern indigo snake monitoring report must be submitted to the appropriate Service Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted when any Eastern indigo snakes are observed or relocated. The report should contain the following information:

   a. results of the tortoise burrow and field surveys;
   b. any sightings of Eastern indigo snakes;
   c. summaries of any relocation activities for the project (e.g., locations where, and when, they were found and relocated); and
   d. other obligations required by FWC, as stipulated in the permit.

APPENDIX E

PHOTOGRAPHS OF THE PROJECT AREA

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Plant Site/Airstrip Overview

Plant Site Focus

Raised Infiltration Bed Site/Upper Airstrip

Airstrip/Plant Site/Housing Focus

Lower Airstrip/Plant Site Focus

Pine Island Overview

Entrance Station Septic Field

Road Shoulder Corridor Pipe Alignment

Proposed Wastewater Treatment Plant Site

Recycle Building Plant Site

Plant Site Airstrip Road

Pine Island Housing Septic Mound

APPENDIX F

LIST OF RECIPIENTS THAT RECEIVED THE SCOPING BROCHURE

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Mailing List for Pine Island/Headquarters Wastewater System Improvements Scoping Brochures
***** Denotes a Member of the South Florida Ecosystem Restoration Working Group

Florida Congressional Delegation (3 copies)
U.S. Senate, Hon. Bob Graham
U.S. Senate, Hon. Bill Nelson
U.S. House of Representatives, Hon. Ileana Ros-Lehtinen

Federal Agencies (22 copies)
Advisory Council on Historic Preservation – Mr. Don Klima
U.S. Army Corps of Engineers, Jacksonville District Engineer – Col. James May*
U.S. Army Corps of Engineers, Regulatory Branch, Miami- Paul Kruger
U.S. Attorney's Office, Assistant U.S. Attorney – Norman O. Hemming, III
U.S. Coast Guard – Commander (oan) Seventh Coast Guard District
U.S. Department of Agriculture-Natural Resources Conservation Service – Mr. Ron Smola *
U.S. Department of Commerce-
- National Marine Fisheries Service-Southeast Fisheries Science Center
  - Mr. Brad Brown, Director*
- NOAA-Florida Keys National Marine Sanctuary – Superintendent Billy D. Causey*
- NOAA/Atlantic Oceanographic and Meteorological Laboratory – Mr. Peter Ortner*

U.S. Department of the Interior
- Bureau of Indian Affairs – Eastern Office, Mr. Chris Katzenmiller*
- Fish and Wildlife Service – South Florida Field Office Supervisor, Mr. Jay Slack*
  - Vero Beach Office - Mr. Allen Webb
  - Big Pine Key Office - Mr. Andrew Gude
- Geological Survey- Biological Resources Division- Mr. G. Ronnie Best*
- National Park Service
  - Big Cypress National Preserve, Superintendent, Mr. John Donahue
  - Biscayne National Park, Superintendent Ms. Linda Canzanelli
  - Everglades National Park employees (300 people)
  - Southeast Regional Office, Division Planning and Compliance –
    - Mr. Rich Sussman, Ms. Jami Hammond
- South Florida Ecosystem Restoration Task Force – Exec. Director Terrence "Rock" Salt

U.S. Department of Transportation – Federal Highways Administration, Mr. George Hadley*
U.S. Environmental Protection Agency
- Groundwater Technology & Management Section, Atlanta GA- Ms. Alanna Conley
- South Florida Field Office, Director Richard Harvey*

Federal Emergency Management Agency – Natural Hazards Branch Chief- Atlanta

Native American Tribes (11 copies)
Miccosukee Tribe of Indians of Florida
- Chairman Billy Cypress
- Water Resources Manager, Mr. Truman E. Duncan*
- Mr. Dexter Lehtinen
- Dr. Terry Rice*
- Mr. Fred Dayhoff

Seminole Tribe of Florida
- President Mitchell Cypress
- Water Resources Director, Mr. Craig Tepper*
- Lewis, Longman, and Walker - Ms. Beth Carlson

Independent Miccosukees – Ms. Virginia Poole
Seminole Nation of Oklahoma

Principal Chief Kenneth Chambers
Historic Resources Specialist - Mr. Emman Spain

State of Florida (18 copies) (Clearinghouse will send CD ROMS to 15 agencies)
Office of the Governor, Senior Government Analyst – Mr. Richard Smith*
Florida Department of Agriculture & Consumer Services – Mr. W. Ray Scott
Florida Department of Community Affairs
Division of Community Planning – Mr. Henry E. Timmerman
Florida State Clearinghouse – Ms. Vanessa Holmes, Acting Coordinator
Florida Department of Environmental Protection
Director, Ecosystem Planning and Coordination, Mr. Ernest Barnette* - Tallahassee
Southeast District, Environmental Manager – Ms. Jayne Bergstrom
Southeast District , Environmental Resources – Ms. Kris McFadden
Florida Department of Transportation
Ms. Donna Pope
District Six Environmental Administrator, Ms. Marjorie Bixby*
Florida Fish and Wildlife Conservation Commission,
Mr. Allan Egbert – Tallahassee
Florida Department of State-Division of Historical Resources
State Historic Preservation Officer- Ms. Janet Snyder Matthews
Florida House of Representatives, District 120 – Hon. Ken Sorenson
Florida Senate – Hon. Larcenia J. Bullard
Hon. Gwen Margolis
South Florida Water Management District-
Executive Director - Mr. Henry Dean*
Senior Policy Advisor - Ms. Kathy Copeland*
Lead Planner, Water Resources Advisory Commission - Mr. Julio Fanjul

Regional (1 copy)
South Florida Regional Planning Council, Executive Director, Ms. Carolyn A. Dekle

County Government (10 copies)
Broward County Department of Natural Resources, Director Steve Sommerville*
Miami-Dade County Commission, District 8 Ms.Katy Sorenson
Miami-Dade County Commission, District 9, Mr. Dennis Moss
Miami-Dade County Department of Environmental Resources Management, Director - Mr. John Renfrow
Miami-Dade County Water and Sewer Department - Mr. Roman Wenglowsky
Miami-Dade County, Office of the County Manager, Water Resources Manager - Mr. Roman Gatesi, Jr.
Monroe County Environmental Resources Department – Director, Ms. Marlene Conaway
Monroe County Marine Resources Department – Director, Mr. George Garrett
Palm Beach County Water Utilities Department – Mr. Fred Rapach*
Palm Beach County, Water Resources Manager – Mr. Kenneth S. Todd

Local Government (2 copies)
City of Homestead, Mayor Roscoe Warren
City of Florida City, Mayor Otis Wallace

Organizations (28 copies)
Audubon Society of the Everglades- Ms. Rosa Durando
Audubon Society of Florida, CEO Stuart Strahl
Biscayne Bay Foundation, Mr. Edwin Moure
Broward County Sierra Club, Mr. Rod Tirrell
The Conservancy of Southwest Florida – Ms. Kathy Prosser
Citizens for a Better South Florida – Ms. Audrey Ordenes
Clean Water Action – Ms. Kathy Aterno
Earthjustice Legal Defense Fund – Mr. David Guest
Environmental Defense Fund - Mr. Tim Searchinger
Everglades Coalition Co-Chair – Ms. Shannon Estenoz
Everglades Coordinating Council – Ms. Barbara Jean Powell
Florida Audubon Society – Mr. Charles Lee
Florida Defenders of the Environment – Ms. Susan Uhl Wilson
Florida Keys Audubon Society - Director
Florida National Parks and Monuments Association – Mr. Caulion Singletary
Florida Wildlife Federation – Mr. Manley Fuller
Friends of the Everglades – Mr. David P. Reiner
Izaak Walton League, Mr. Michael Chenoweth, Ms. Juanita Green
Ocean Conservancy – Florida Keys Office, Mr. David Holtz
Sierra Club Fla. – Mr. Craig Diamond
Sierra Club- St. Petersburg – Frank Jackalone
Sierra Club Miami Group - Mr. Alan Farago
Ms. Barbara Lange
Heide Kuchenbacker
National Parks Conservation Association – Ms. Mary Munson
Natural Resources Defense Council – Ms. Sarah Chasis
National Wildlife Federation- Mr. Kris Thoemkke
Redlands Conservancy, Mr. Karsten Rist
Tropical Audubon Society – Executive Director, Mr. Don Chinquina
The Wilderness Society – Mr. Jim Waltman
Word Wildlife Fund Florida Keys Office, Ms. Debbie Harrison
1000 Friends of Florida – Mr. Charles Pattison

Other (9 copies)
CDM, Inc. - Mr.Andrew Lynn
Southeast Environmental Research Center, FIU, Mr. Ron Jones, Director*
University of Miami, RSMAS, Dr. Daniel Suman
Homestead/Florida City, Chamber of Commerce, Ms. Mary Finlan
Tropical Everglades Visitors Association, Executive Director Barry Kenney
Lee County Smart Growth, Mr. Wayne E. Daltry*
Mr. Dennis Sytsma
Mr. Steve Sapp, Sapp Farms, Homestead
Mr. and Ms. Denise Stoner

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APPENDIX G

SEAC CONSULTATION PACKAGE

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C18 DSC-PM
EVER-191C

APR 0 9 2003

George Smith
Southeast Archeological Center
National Park Service
2035 E. Paul Dirac Drive
Johnson Building, Suite 120
Tallahassee, Florida 32310

Re: Pine Island Wastewater Treatment Plant (Everglades National Park)

Dear Mr. Smith:

The Everglades National Park is proposing to develop a new Wastewater Treatment Facility to service the Pine Island locality of the Park. A draft Environmental Assessment (EA) for the project has been prepared and we have concluded our internal review in preparation to release the EA to the public. As a result of this review, it was determined that the impacts resulting from the undertaking have the potential to effect cultural resources. In compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA) and 36 CFR 800.8 a copy of the Environmental Assessment will be provided the Florida SHPO for review.

In order to assure that sufficient information has been included in that document to allow for the SHPO to make informed comments, we are requesting your review of the enclosed information and subsequent in recommendations of the level and nature of necessary information needed to satisfy both the NPS responsibility to the resource and to comply with both the NHPA and the National Environmental Policy Act.

To that end I am including the following information which I believe will be sufficient for your office to make an assessment and recommendations for the need of cultural resources work as a result of the undertaking. That response will in turn be included in the EA in a manner that will allow the SHPO to review and comment.

- A project description describing the nature of the project and engineering details as best they are known. (Precise Information such as depth of fill, expected depth of impact, width of trench and construction zone etc. are currently unavailable. This information will be developed during the final design stages)
- Description of the Ingraham Highway drawn from a draft NRHP nomination
- A map of the project area showing the relationships to other facility, features, roads, etc.
- A photographic image of the project area

- A USGS topographic showing the area of impacts since their records are based on those maps.

This is a FY 03 Line Item Construction project and it is critical that we proceed with public review of the EA and subsequent award of the construction contract. Therefore we would like your recommendations as soon as possible.

Thank you in advance for your review of this project. Should you have any questions regarding the project, please contact Cultural Resource Specialist, Eric Petersen at (303) 969-2317 or Project Manager, Tom Murphy at (303) 969-2438.

Sincerely,

SIGNED

Tom Murphy

cc: (w/ att.)
DSC Petersen, Murphy
EVER Brien Culhane, Mike Jester, Nancy Russell
SERO Bob Blyth

Attachments

1 – project description
2 – 3 project maps
3 – USGS quad map

Ingraham Highway

(Adapted from draft National Register of Historic Places nomination for Ingraham Highway Historic District)

The road, the first highway to cross the Everglades, is approximately 41 miles long and 37' wide in most areas. The current park road from Florida City to Flamingo incorporates approximately the first 12 and last 17 miles of the old road. The abandoned portions of the road are mostly used as administrative roads or trails.

Construction of Ingraham Highway

As early as 1910, the J. B. McCrary Company surveyed the area from present-day Homestead to Cape Sable to locate possible routes for a road. Four years later, James E. Ingraham (by then president of the Model Land Company and vice president of the Florida East Coast Railroad) was still contemplating building a road from Homestead to Cape Sable and requested that Florida Governor William Sherman Jennings provide additional information on the proposal. Shortly thereafter, the Model Land Company and Dade Muck Company worked with the Dade County Commissioners, who contracted with the J. B. McCrary Company in November 1915 to design and build the highway. Although construction began in 1915, the difficult terrain and remote location impeded progress. The road was barely completed from Homestead to Royal Palm State Park for its dedication on November 22, 1916. During the opening ceremony, the road was officially dedicated and named Ingraham Highway after James E. Ingraham for his efforts in creating the state park and developing the area.

By December 1916, the J. B. McCrary Company realized it could not complete the road under the current contract and requested a six-month extension. A few months later, the company renewed its work on the highway and purchased additional equipment and the services of an engineer to complete construction specifications.

The J. B. McCrary firm used the American Steel dredge to acquire fill for the proposed highway. Due to the geology of the Everglades, the company also had to develop other new and innovative construction techniques and change the building specifications outlined in the contract to complete the road. According to Lawrence E. Will, a dredgeman later involved in the road's construction, a right-of-way crew would first clear the trees and brush out of the proposed road corridor, cut the trees into four-foot lengths, and stack the cords on the side of the clearing for fuel for the dredge. A water barge would search the area for fresh water for the steam boiler on the dredge. Workers assembled the American Steel dredge at Royal Palm State Park and used it to construct a canal [Homestead Canal] along the highway for drainage and fill. In some areas, the marl and rocky sub-surface of the road bed would have to be blasted with explosives to clear a path for the canal and provide fill for the road. A completed section of the road consisted of limestone and earth fill excavated from the neighboring drainage canal. The construction crew then graded, rolled, and oiled the road to finish its surface.

The United States' entry into World War I in April 1917 delayed the completion of Ingraham Highway. By August 1917, the J. B. McCrary Company had yet to finish the highway, and the Dade County Commissioners had some concerns

By spring 1920, the J. B. McCrary Company had completed work on Ingraham Highway as far as the Monroe County line. It had finished road work at Royal Palm Hammock and West Lake (by the Monroe-Dade County line), and had rolled and graded the highway to the Monroe County line.

Project Description
The existing Pine Island and headquarters/visitor center collection lines, septic tanks, and drainfields would be abandoned under this alternative.

A new system of collection lines, package treatment plant, effluent discharge transmission lines and two new percolation ponds would comprise the proposed wastewater system for the Pine Island area. The footprint of this new system would cover an area of approximately 3.0 acres. Under the preferred alternative, there would be a new system of collection lines, connecting each individual housing unit, the park entrance station, and headquarters/visitor center complex to one new treatment plant (see Figure 5 and 6). This action would require approximately 2,000 feet of new collection lines and 7,500 feet of transmission lines. Trenching would be done in previously disturbed park road shoulders and driveways, where possible. The trenching for the new collection lines would require a 4 foot wide trench at a depth of 3 feet, causing some new soil disturbance where the fill that comprises most of the Pine Island area is less than 3 feet in depth. Installation of the wastewater conveyance would require about 1 acre of surface disturbance. Because of the flat topography in the area, the collection/transmission lines would be pressurized by installation of pump stations and force mains. This would ensure proper movement of raw wastewater from the sources to the new treatment facility.

The selection of the type of package wastewater treatment plant would be made at a later stage of the design process. The new package wastewater treatment plant, designed to treat up to 30,000 gallons per day, would occupy approximately 2,200 square feet (0.05 acres) and be located on a previously disturbed site adjacent to and just south of the existing recycle building (see Figure 4). The placement of the wastewater treatment plant would avoid wetlands and pinelands. This existing access road to this new facility would be gated, providing National Park Service administrative access only.

A new effluent discharge line (approximately 3,960 feet in length) from the new treatment plant near the recycle center would be buried under the abandoned 1000 foot airstrip access road (previously disturbed area) and discharged into two new percolation ponds. Following installation of the discharge line, the 1000 foot access road from the recycle building to the abandoned airstrip would be retained at its present width as a gravel road, but rehabilitated (grading and additional gravel) to provide reliable park monitoring/maintenance access.

Two new percolation ponds/berm (each one acre in size) would be located on the southeasterly portion of the abandoned airstrip (previously disturbed area), avoiding direct impact on wetlands, pinelands, or surface water. The ponds would be unlined, with the exception of the berm around the ponds. The percolation ponds would not be fenced, but would be signed as a "no entry" area to prohibit visitor (hiker) use.

Consequently, Ingraham Highway was built between 1915 and 1922, and was the first highway to penetrate the Everglades. As part of the highway's construction, a series of canals were built to provide fill and drainage for the area. The creation of Royal Palm State Park was also linked to the construction of Ingraham Highway; the State of Florida worked with the Florida East Coast Railroad and the Florida Federation of Women's Clubs to establish Royal Palm State Park to preserve the region's unique flora and fauna. Road crews worked overtime to complete the road to the park for its dedication ceremony in 1916, when the highway was officially named Ingraham Highway in honor of James E. Ingraham, vice president of the railroad. These resources form a historic district of local and state significance along Ingraham Highway.

Holloway's men used the same American Steel dredge that built the first section of the highway and cleared a 200-foot right-of-way to excavate the canal and obtain fill for the road. Construction techniques were similar to those used in the construction of the Dade County portion of the road; a right-of-way crew would first clear the area, then cut the wood into four-foot lengths, and stack the cords on the side of the clearing for fuel for the steam dredge. A construction crew of approximately 16 men worked in two or three shifts to fuel the boiler, haul barges of fresh water to supply the steam engine, operate the dredge, prepare meals, and mend broken items. According to Lawrence Will, who worked on Holloway's crew, construction proceeded rapidly at first:

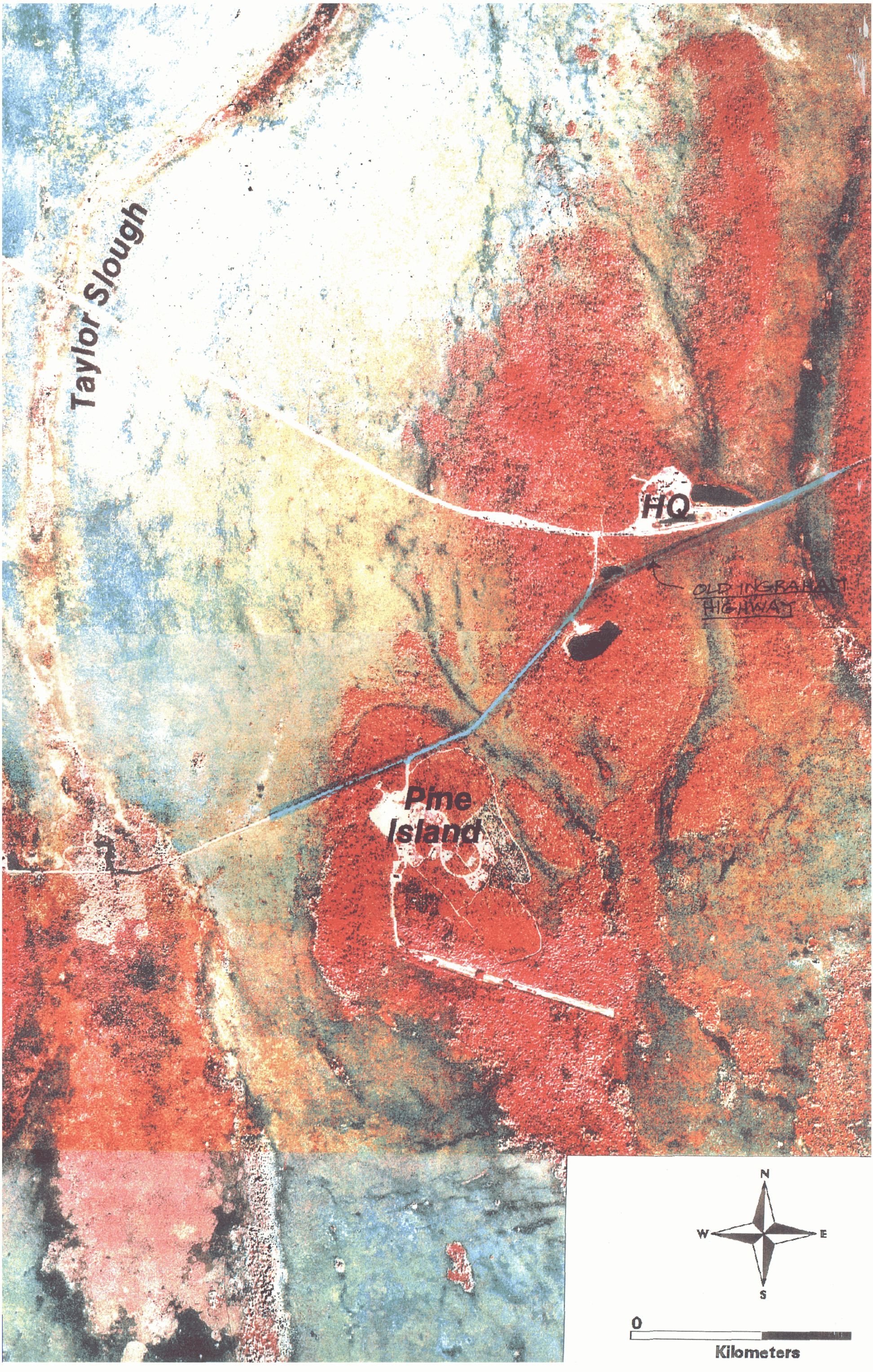
Ingraham Highway

Built between 1915 and 1922, Ingraham Highway was the first highway to penetrate the Everglades. The Model Land Company and the Dade Muck Company worked with the Dade County Commissioners and contracted with the J.B. McCrary Company to build the road in Dade County. Due to the geology of the Everglades, the company had to develop new and innovative construction techniques and change the building specifications outlined in the contract to complete the road. A finished section of the highway road included a road bed of limestone and earth fill (excavated or blasted from the neighboring drainage canal) and a graded, rolled, and oiled surface. The Monroe County portion of Ingraham Highway was never completed to Cape Sable and remained an unpaved marl-surface road to Flamingo and Bear Lake. Nonetheless, similar construction techniques were used in other roads in south Florida in the 1920s, including the Tamiami Trail. As such, the road is significant under Criterion C, Design/Construction for incorporating new construction techniques used in later roads built through the Everglades. The road also has local and state significance as the first highway in the Everglades and for its link to the commercial development of south Florida. (Criterion A)

Recent Highway Work

In the 1960s, the National Park Service built a new road that ran west from the park entrance through the pine lands surrounding Long Pine Key and across the open fresh water marl prairie to Mahogany Hammock and Sweet Bay Pond, where it connected with the old Ingraham Highway to Flamingo. Nonetheless, most of the hard-surfaced portions of the old road were still in use and in their original, relatively undeveloped setting. As of 1993, most of the first 12 and the last 17 miles of the paved section of Ingraham Highway had been incorporated into the current modern road from Florida City to Flamingo. Although the NPS abandoned 12 ½ miles of the highway, it still used some of the old roadway as administrative park roads or trails and removed only a small portion of the road bed (less than five miles) to restore the native landscape. In the mid-1990s, the park service took less than a mile of the old roadbed to restore wetlands and increase the water flow to Taylor Slough.

Nonetheless, new and historic vegetation reveal the location of the former road bed; royal palms still line old road corridors, and new, exotic vegetation indicates areas where the roadbed has been removed. Portions of the unfinished highway in Monroe County are currently used as hiking trails for the park. Overall, the approximately 41-mile highway retains enough integrity of location, setting, design, materials, workmanship, feeling, and association for listing on the National Register of Historic Places as a component of a historic district.


Taylor Slough
HQ
OLD INGRAHAM HIGHWAY
Pine Island
N
W
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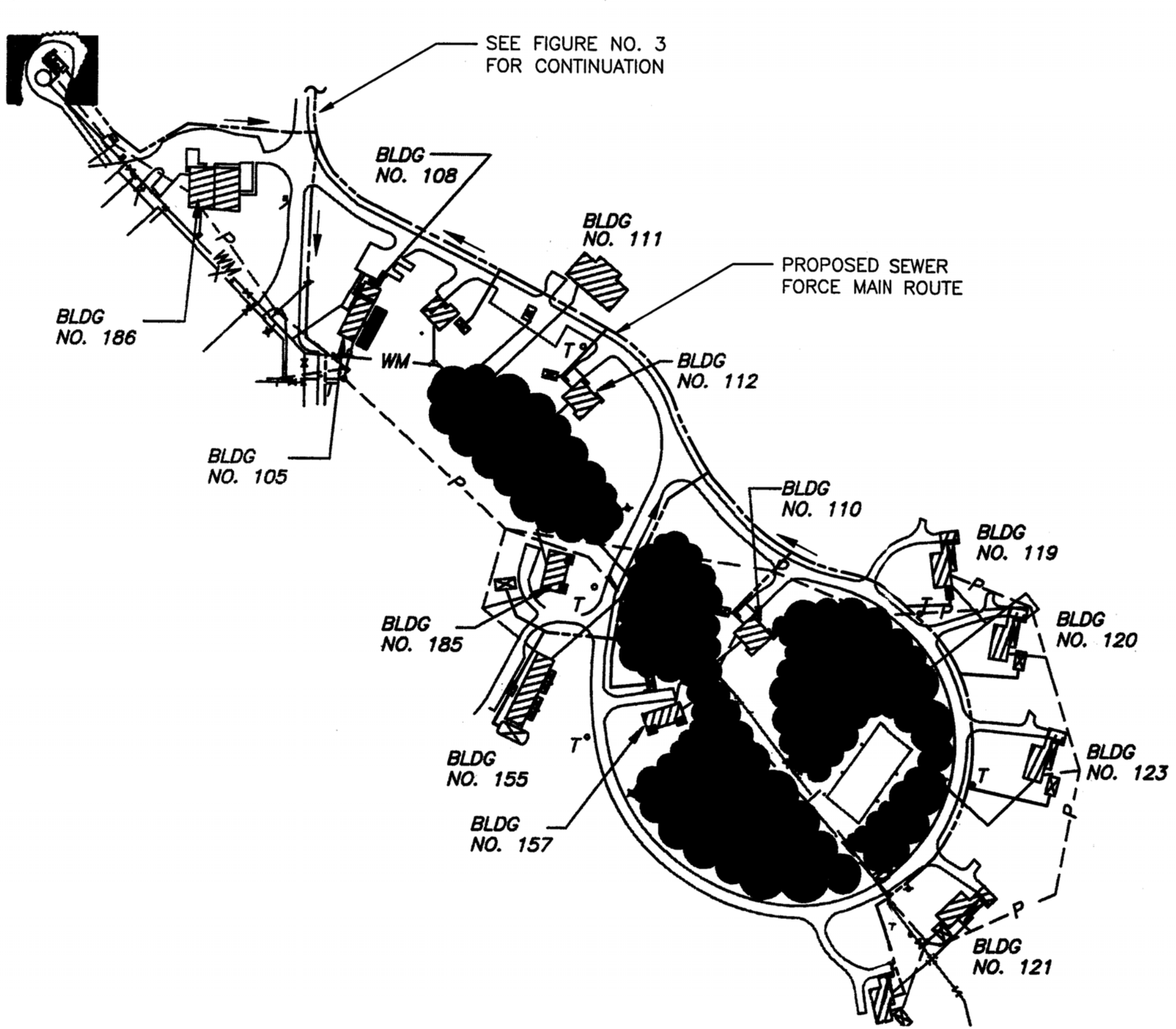
0
Kilometers


SEE FIGURE NO. 3
FOR CONTINUATION
BLDG
NO. 108
BLDG
NO. 111
PROPOSED SEWER
FORCE MAIN ROUTE
BLDG
NO. 186
WM
BLDG
NO. 112
BLDG
NO. 105
BLDG
NO. 110
BLDG
NO. 119
BLDG
NO. 120
BLDG
NO. 185
BLDG
NO. 155
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NO. 123
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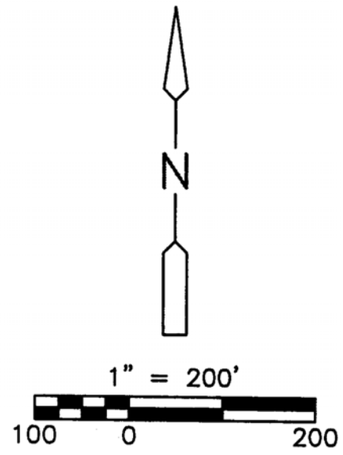
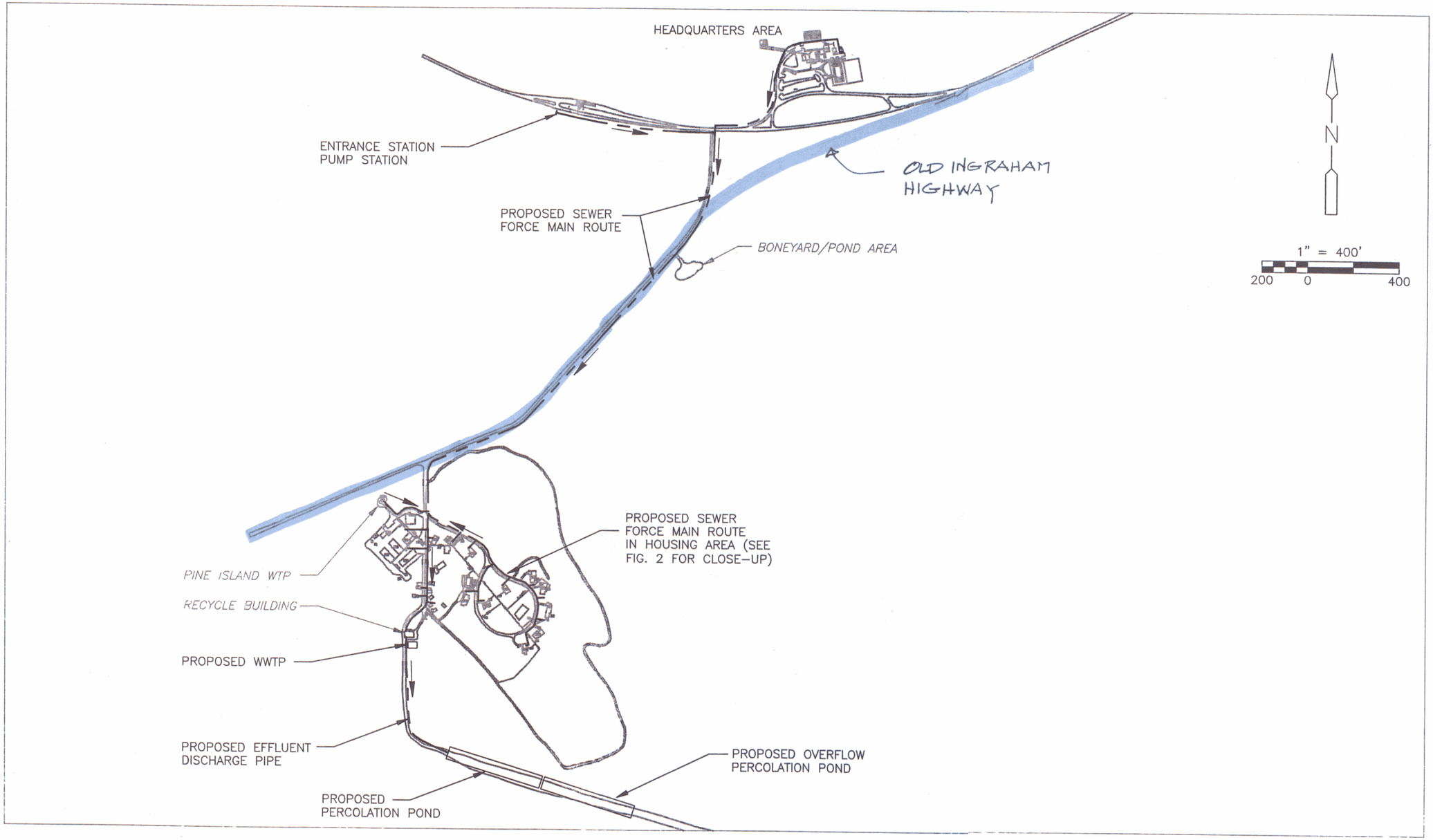
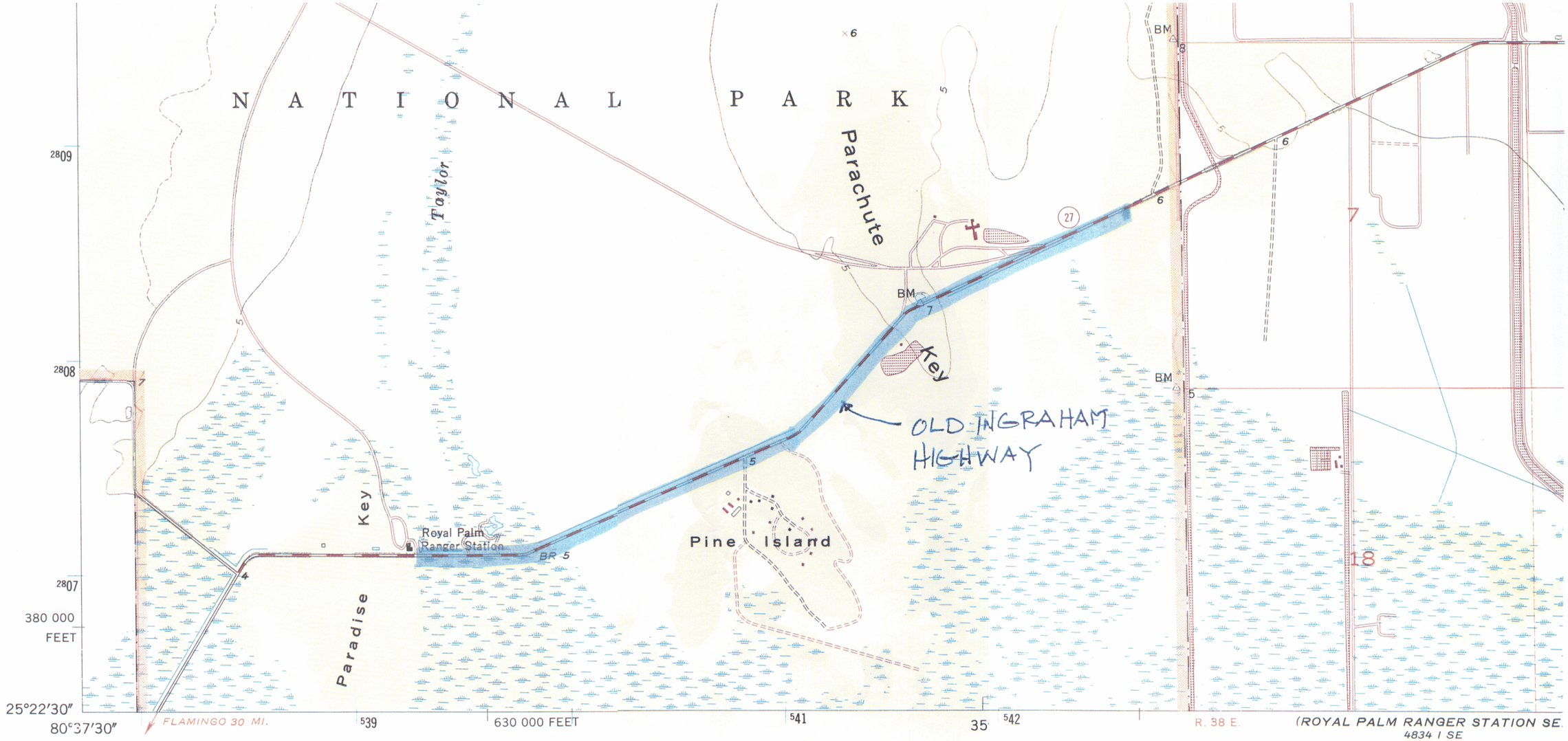
NO. 157
BLDG
NO. 121


N
1" = 200'
100
0
200



CDM

Figure No. 1
National Park Service
Headquarters and Pine Island
Wastewater Collection System



Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and Florida Geodetic Survey

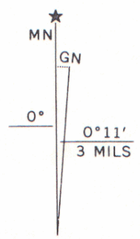
Culture and drainage in part compiled from aerial photographs taken 1955. Topography by planetable surveys 1956

Polyconic projection. 1927 North American datum
10,000-foot grid based on Florida coordinate system, east zone
1000-meter Universal Transverse Mercator grid ticks,
zone 17, shown in blue

Dashed land lines indicate approximate location
Certain land lines unsurveyed in T. 58 S.-R. 38 E.

Revisions shown in purple compiled from aerial photographs taken 1973. This information not field checked

Map photoinspected 1979
No major culture or drainage changes observed



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

1 0 1/2 0

1000 0 1000 2000 3000 4000 5000

1 .5 0

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY
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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS